



De Cesari, A., & Ozkan, N. (2015). Executive incentives and payout policy: Empirical evidence from Europe. *Journal of Banking and Finance*, 55, 70-91. <https://doi.org/10.1016/j.jbankfin.2014.12.011>

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Link to published version (if available):
[10.1016/j.jbankfin.2014.12.011](https://doi.org/10.1016/j.jbankfin.2014.12.011)

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Executive Incentives and Payout Policy: Empirical Evidence from Europe *

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First version: December 9th, 2012

This version: November 6th, 2014

Abstract

We investigate how corporate payout policy is influenced by executive incentives, i.e. stock and option holdings, stock options delta, and stock-based pay-performance sensitivity for 1,650 publicly listed firms from the UK, Germany, France, Italy, the Netherlands, and Spain, over the period from 2002 to 2009. Our results show that executive stock option holdings and stock options delta are associated with lower dividend payments in our sample of European countries, where we do not observe any presence of dividend protection for executive stock options. We find that this relationship is mainly driven by exercisable stock options and by options that are in-the-money. Additionally, we observe that executive stock option holdings and stock options delta have a negative impact on total payout suggesting that executives do not substitute share repurchases for dividends. Furthermore, the fraction of share repurchases in total payout increases as executive stock option holdings and stock options delta increase. Finally, our results show that executive share ownership and stock-based pay-performance sensitivity may mitigate agency conflicts by significantly increasing the level of total payout.

JEL Classification: G35, G32, G34

Keywords: Executive incentives; Dividends; Share repurchases; Europe

* We thank Christopher Baum, Andrey Golubov, Jarrad Harford, Kai Li, Roni Michaely, and the participants at the EFMA 2013 meetings in Reading, the FMA 2013 meetings in Chicago, and the MFS 2013 meetings in Izmir for insightful comments and suggestions.

1. Introduction

There has been a considerable rise in share repurchase activity among US corporations since 1980s. For instance, the ratio of corporate expenditures on share repurchase programs to total earnings increased from 4.8 percent in 1980 to 41.8 percent in 2000 in US firms (Gruillon and Michaely, 2002). Recently we observe that European firms seem to follow a similar track and have been increasingly engaging in share repurchase activity, while they have been reducing their dividend payments (e.g., Eije and Megginson, 2008; Denis and Osobov, 2008). Until 1980s many European countries prohibited share repurchase as a payout policy. However, there have been some regulatory changes starting in 1980s which have made it possible for European countries to use share repurchase as an alternative payout policy to cash dividends.¹

Another parallel development to this recent surge in share repurchases and reduction in dividend payments in Europe has been the convergence of executive compensation packages towards the US model of executive compensation with a greater emphasis on stock-based compensation.² Even though executives receive relatively lower compensation in Europe than those in US, there has still been an increase in convergence in terms of structure of compensation, i.e. stock options and long-term incentive payments have become a larger part of executive compensation in European companies.

In this paper, we aim to shed a light on the relationship between executive incentives and payout policies in 1,650 publicly listed firms from the UK, Germany, France, Italy, the Netherlands, and Spain, over the period from 2002 to 2009.³ In particular, we focus on how

¹ For instance, until 1998, German public corporations were not allowed to buy their shares back except under some special circumstances (Siems and De Cesari, 2012).

² See, for instance, Cheffins (2003), Cheffins and Thomas (2003), Gomez-Mejia and Werner (2008), Croci et al. (2012), and Fernandes et al. (2013).

³ Our sample of firms represents approximately 85 % of market capitalization of publicly traded companies in our sample countries.

executive incentives in the form of executive shareholdings, option holdings, stock options delta, and stock-based pay-performance sensitivity can influence firms' choice of payout policy, i.e. dividend payment or share repurchase, and level of payout. Thus, our purpose is to advance our understanding about the extent to which the recent decline in dividends and surge in share repurchases in Europe can be explained by changes in executive compensation packages.

The extant literature which mainly focuses on US companies provides inconclusive evidence on the relationship between managerial incentives and payout policy. Previous studies (e.g., Lambert et al., 1989; Jolls, 1998; Fenn and Liang, 2001; Kahle, 2002) report that executive stock options can play an important role in influencing the decision to repurchase stock rather than increase dividends. Two reasons have been put forward for explaining the negative (positive) link between executive stock options and dividend payments (share repurchases). Firstly, the value of stock options declines when a stock goes ex-dividend. Thus, executive stock options create incentives for repurchases and/or retained earnings rather than the payment of dividends. Secondly, managers might prefer to use repurchased shares to fund executive stock option plans rather than issuing new stock to avoid diluting earnings per share.

As part of executive incentives, executive shareholdings as well as stock option holdings can influence corporate payout policies. Executive stock ownership can, in fact, align the interests of managers and shareholders leading to an increase in the likelihood and level of payout (Fenn and Liang, 2001). Alternatively, higher shareholdings by executives can be a substitute governance mechanism to payout in the form of dividends or share repurchases (Hu and Kumar, 2004).

Our measures of executive incentives include both CEO and other executives' share ownership and stock option holdings, which are distinguished between exercisable and non-

exercisable and between in-the-money and out-of-the-money stock option holdings. If executives are concerned about the value of their stock option holdings, this would be most evident for their stock options that are exercisable and/or in-the-money. Examining company annual reports, we observe that our sample firms do not have dividend protection for their executives' stock option holdings. Thus, the fact that dividend payments would reduce the value of stock options held by executives might potentially influence the executives' preferences for repurchases and/or retained earnings rather than dividend payments. Additionally, different from prior studies on executive incentives and payout policy we use stock options delta and stock-based pay-performance sensitivity as alternative measures of executive incentives.

One major characteristic of our sample countries from continental Europe is that their firms have relatively higher concentrated share ownership than US or UK firms, which are commonly widely-held (e.g., Faccio and Lang, 2002). In a firm with high concentrated share ownership, managerial opportunism is likely to be relatively limited. Thus, in contrast to US firms, managers might not be able to use payout policy as a way to serve their personal interests and reduce dividend payments in their attempt to maintain the value of their stock option holdings. In our empirical analysis, we control for the impact of concentrated share ownership by including a measure of closely held shares, i.e. large blockholders' share ownership.⁴ In UK firms different from continental European firms, institutional shareholders are major shareholders and their activism has been documented by previous studies (e.g., Becht et al., 2009; Ozkan, 2011). Recently, institutional share ownership has been increasing in continental European countries as well (Aggarwal et al., 2011). Our empirical analysis incorporates the potential impact of institutional share ownership in examining the

⁴ Chay and Suh (2009) also use the closely held shares variable from Worldscope database as a measure of agency conflicts.

relationship between payout policy and executive incentives. Furthermore, we control for the potential impact of board characteristics including board size and fraction of independent directors in our empirical analysis.⁵

Our findings show that executive stock option holdings and stock options delta are associated with lower levels of dividend payments. As executives' stock option holdings and stock options delta increase, firms' likelihood and level of dividend payments decline. Our results suggest that executives who might be concerned about the value of their stock options reduce dividends. Thus, payout decisions of European firms seem to reflect the preferences of executives whose wealth in the form of stock option holdings can be affected by those decisions. When we classify stock option holdings into a group of exercisable and non-exercisable option holdings, we observe that the negative impact of executive stock option holdings on dividend payments mainly comes from exercisable stock option holdings. This finding suggests that as executives in European firms accumulate more stock options as part of their equity-based compensation and as those options become exercisable, executives become reluctant to make dividend payments which would lead to a decline in the values of their stock option holdings. Similarly, we observe that holdings of in-the-money options are more negatively related to dividend payments than holdings of out-of-the-money options. Further, we find that executive stock option holdings and stock options delta do not have a significant impact on the level and likelihood of share repurchases. Our results show that the fraction of share repurchases in total payout (i.e., dividends plus repurchases) increases as executive stock option holdings and stock options delta increase, but this seems to be mainly caused by a decline in dividend payments. In support of this conclusion, we report that CEO and executive stock option holdings and stock options delta have a negative effect on total

⁵ Hu and Kumar (2004), and Renneboog and Trojanowski (2011) also include board characteristics in their payout regression models.

payout levels. Finally, we find that executive share ownership and stock-based pay-performance sensitivity have a positive and significant impact on the level and likelihood of dividend payments and share repurchases in our sample firms.

There is a strand of literature which focuses on how executive incentives influence various corporate policies including equity issuance decisions, pension plans, cash holdings, voluntary liquidation (e.g., Brisker et al., 2014; Anantharaman and Lee, 2014; Liu and Mauer, 2011; Mehran et al., 1998). We contribute to the current literature in several ways. First, we extend this literature on executive incentives by providing empirical evidence about how executive incentives can influence the level and likelihood of dividend payments, share repurchases, and total payout in a set up where firms have mainly concentrated ownership, i.e. for our sample of continental European firms. In our empirical analysis, controlling for closely held shares, institutional investors' shareholdings, and board characteristics, we observe that executive stock option holdings and stock options delta lead to a decline in the level and likelihood of dividend payments. Thus, this finding explains one of the factors, i.e. changing executive compensation structure in European firms with an increasing emphasis on equity-based compensation that plays a significant role in lowering dividend payments in Europe. Secondly, we add to the limited literature on how common practices on dividend protection can influence executives' willingness to pay dividends. We observe that our sample of European firms do not provide dividend protection for executive stock option holdings, which can potentially influence executives' reluctance on paying dividends as their stock option holdings increase. Thirdly, we provide evidence that higher executive stock option holdings do not seem to lead to a substitution from dividend payments towards share repurchases. Finally, we report that executive stock-based pay-performance sensitivity and share ownership by executives, which align managerial with shareholder interests, lead them to distribute more cash by increasing payouts.

The remainder of the paper is organized as follows. Section 2 reviews prior studies including recent trends in corporate payout policies and the links between managerial incentives and payout decisions. Section 3 describes our sample while Section 4 defines the variables used in the empirical analyses. Section 5 presents our empirical results. Finally, Section 6 concludes.

2. Literature review and research questions

2.1. Executive stock options and cash dividends

Recent trends in the payout policies of European firms show an increasing reliance on share repurchases at the expense of dividend payments (e.g., Eije and Megginson, 2008; Denis and Osobov, 2008). One of the objectives of this study is to test whether these trends can be partly explained by the recent surge in equity-based compensation in Europe.⁶ Previous researchers mainly focus on US firms and show that executive stock option holdings may incentivize executives to minimize dividend payments and boost stock repurchase activities. Lambert et al. (1989) show that dividend payments are reduced relative to expected levels following the adoption of executive stock options. This finding is consistent with the hypothesis that dividend payments, *ceteris paribus*, reduce the value of the executive stock options, and thereby increases the cost to the executive of paying dividends.⁷ Since US executive stock options are generally not dividend-protected, their values, like those of all call options, are negatively related to future dividend payments.

⁶ For instance, Cheffins (2003), Gomez-Mejia and Werner (2008), Croci et al. (2012), and Fernandes et al. (2013) show that there has been an increase in the use of equity-based compensation in continental European firms.

⁷ Fenn and Liang (2001), Kahle (2002), Hu and Kumar (2004), Brown et al. (2007), Cuny et al. (2009), and Sharma (2011) confirm the negative relation between executive stock option holdings and dividend payments.

While the US literature is quite extensive, there are only few studies using European data. Liljeblom and Pasternack (2006) focus on Finland, a country where a large share of executive stock option plans is dividend-protected. They find that Finnish companies with more executive options pay higher, not lower, dividends if their options are dividend-protected. Burns et al. (2013) investigate the relationship between the equity-based compensation granted in a given year and payout policy in a sample of European firms. They limit their definition of executives' incentives to the equity-based compensation granted to CEOs in a given year. In our study, we include both CEO's and executives' exercisable (in-the-money) and unexercisable (out-of-the-money) stock option holdings and stock ownership controlling for the impact of closely held shares, institutional shareholdings, and board characteristics. We believe that accumulated stock option holdings can provide a more comprehensive measure for executives' incentives than equity-based compensation granted during a year. Furthermore, different from previous studies on corporate payout policy and executive incentives we use stock-based pay-performance sensitivity and stock options delta as alternative measures of executive incentives.

The very limited evidence on the effects of executive stock options on cash dividends in Europe is possibly explained by the lack of comprehensive information on dividend protection. In order to fill this gap, we have searched through a large sample of the annual reports published by the UK, German, French, Italian, Dutch, and Spanish firms in our dataset.⁸ By reading the company annual reports, we have not come across any evidence of dividend protection for executive stock options. Hence, in line with the existing evidence, we expect executive stock option holdings and stock options delta to have a negative impact on

⁸ In our search, we have considered annual reports for 10% of the UK firm-years, 20% of the firm-years for German, French, Italian, and Dutch firms, and 100% of the Spanish firm-years in our main dataset. Further, Tower Watson confirmed the lack of dividend protection for stock option holdings in our sample of European firms.

dividend payments controlling for closely held shares, institutional ownership, and other firm-specific variables.

2.2. Executive stock options, share repurchases, and total payout

Several motives can be put forward to suggest a positive impact of executive stock options on share repurchase activities. As highlighted above, managers are likely to reduce dividend payments when they hold stock options. It is possible that the cash that is not paid out through dividend payments is, instead, distributed by making stock repurchases (Fenn and Liang, 2001; Kahle, 2002). In other words, executive stock options may affect the fraction of dividends in total payout rather than the total payout itself. The existence of outstanding executive stock options may also have a more direct positive effect on share repurchase activities.⁹ Several authors (e.g., Kahle, 2002; Bens et al., 2003; Cuny et al., 2009) posit that by repurchasing shares companies try to offset EPS dilution caused by the usage of employee stock options. The US empirical evidence on the effect of employee stock options (including executive options) on stock repurchases offers a clear conclusion: there is positive relation between repurchases and stock options (e.g., Fenn and Liang, 2001; Kahle, 2002; Bens et al., 2003; Sharma, 2011). In contrast, prior US findings for total payout are quite mixed.¹⁰ As for European firms, the existing literature is very limited, especially concerning total payout. Liljeblom and Pasternack (2006) report a statistically insignificant relation between repurchase activities and executive stock options in Finland.¹¹

⁹ As first highlighted by Kahle (2002), companies can repurchase stock in order to fund the exercise of employee stock options. However, it is not entirely clear why companies would prefer using previously repurchased treasury stock rather than newly issued shares to fund stock option exercises

¹⁰ While Hu and Kumar (2004) show that total payouts are not affected by executive stock options, Cuny et al. (2009) and Sharma (2011) find that larger holdings of options lead to lower total payouts.

¹¹ Relatedly, Young and Yang (2011) investigate the relationship between repurchases and the presence of earnings per share (EPS) performance conditions in executive compensation in UK firms. Their findings show that managers' stock repurchase decisions are influenced by the EPS-related incentives provided by executive compensation.

After reviewing all the existing findings, we cannot formulate a precise *ex ante* expectation as to the effect of executive stock options on total payout in Europe. We expect to find a positive impact of executive stock options and stock options delta on repurchases. However, there are reasons to believe that such impact may not be as strong in our sample of European firms as it is in the US. A large part of the observations in our sample are from the UK. Until December 2003, the UK company law forced firms to cancel all the stock that they had repurchased. Hence, before December 2003, repurchases by UK companies could not be motivated by the need of stock to fund option exercises. Young and Yang (2011) find that even after December 2003 repurchased shares were still, in most cases, routinely cancelled by UK firms. Finally, we focus on executive stock options only, without considering other employee stock options.¹² Thus, we may not be able to find a positive and statistically significant relation between stock options and repurchases in our dataset.

2.3. Executive stock option characteristics and payouts

We argue that executive stock options that are currently exercisable should have a larger influence on current payouts than non-exercisable options. It is, in fact, well-known that the delta of a call option increases as the time to expiration decreases, at least if the option is in-the-money. Since the strike prices of European executive stock options are often equal to the market prices of the underlying shares on the issue dates of the options¹³, executive options are likely to be in-the-money. We observe this empirical regularity in our dataset. Thus, executives holding exercisable options (options with large deltas) should be particularly reluctant to reduce the market value of their stock by paying dividends.

¹² Company annual reports for European firms do not disclose information on employee stock options in a consistent manner, so we are not able to collect data on this.

¹³ This is confirmed by the report “Employee stock options. The legal and administrative environment for employee stock options in the EU” prepared by an expert group for the Enterprise Directorate-General of the European Commission in June 2003 (available at <http://ec.europa.eu/enterprise/policies/sme/business-environment/employee-stock-options>).

Moreover, lowering dividend payments may not be a costless action for managers, especially when their compensation is tied to the value of their company. Hence, managers are more likely to choose lower cash dividends when they can benefit the most from this strategy, i.e. when they hold exercisable options. If repurchases are used by companies as a way to fund employee stock options, then we can expect that share repurchase activities should be affected by holdings of stock options, in particular, those that are exercisable. *Ceteris paribus*, the delta of an in-the-money option is larger than that of an out-of-the money option. Also, in-the-money options are more likely to be exercised. Consistent with the arguments we highlighted above for exercisable options, we expect executive stock options that are currently in-the-money to generate stronger effects on current payouts than out-of-the-money options.¹⁴

2.4. Executive stock ownership and corporate payout policies

Prior literature emphasizes the potential monitoring role of regular dividend payments in mitigating agency problems.¹⁵ *Ex ante*, it is unclear whether we should expect a positive or a negative relationship between management stock ownership and corporate payouts. In the spirit of the outcome model of La Porta et al. (2000), the incentive-alignment effect produced by a higher management ownership should lead to larger payouts. In other words, based on this model we would expect managerial ownership to be positively associated with dividends and stock repurchases. However, in line with La Porta et al.'s (2000) substitute model, payouts and managerial ownership could be viewed as alternative governance mechanisms. Thus, we would predict a negative relationship between managerial ownership and payouts.

¹⁴ Previous evidence on exercisable options and, especially, in-the-money options is very limited and mixed (see Kahle (2002), Bens et al. (2003), and Hu and Kumar (2004)).

¹⁵ For instance, see Easterbrook (1984), Zwiebel (1996), Fluck (1999), and Myers (2000).

Overall, extant literature provides mixed evidence on how managerial ownership influences payout policy for US firms.¹⁶ For a sample of UK firms, Renneboog and Trojanowski (2011) find that executive director share ownership has a significant and positive impact on the likelihood of dividend payments while it is not significantly related to the likelihood of share repurchases. In this paper, we examine the impact of executive and CEO ownership on the level and likelihood of dividend payments and share repurchases for our sample of European firms. In light of the prior literature, we do not have precise *ex ante* expectations regarding the effects of executive and CEO ownership on payouts. Furthermore, we use executive and CEO stock-based pay-performance sensitivity as an alternative measure of executive incentives and examine whether it has an impact on corporate payout decisions.

3. Data and sample selection

We construct our sample by obtaining executive stock option holdings, restricted stocks, and share ownership data for European firms from Boardex, a leading business networking service that provides in-depth information on executive compensation and executive share ownership.¹⁷ There has been a considerable improvement in the coverage of publicly listed European firms from the UK, Germany, France, Italy, the Netherlands, and Spain in Boardex since 2000. Thus, following Croci et al. (2012) our empirical analysis uses Boardex data for the period from 2001 to 2008. Since in our regressions we use lagged values of executive stock option holdings, stock option deltas, and executive share ownership data to build some of the independent variables, we focus on the payout policy of European companies for the period 2002-2009.

¹⁶ See Rozeff (1982), Jensen et al. (1992), Noronha et al. (1996), Fenn and Liang (2001), Hu and Kumar (2004), and Sharma (2011).

¹⁷ Fernandes et al. (2013) use Boardex data for the non-US companies in their sample and Croci et al. (2012) employ CEO compensation data for continental European companies from Boardex.

To build the other variables we need, we complement the Boardex data with market and accounting data from Thomson Datastream and Worldscope, respectively. We exclude observations with valid data from Boardex but without available data from Datastream and Worldscope. We obtain institutional share ownership data from Thomson One Banker while closely held share ownership data are from Worldscope. Board characteristics including board size and fraction of independent directors are extracted from Boardex. Following previous studies, we also exclude firms from financial sectors (SIC 6000-6999) and utilities (SIC 4900-4949) since regulatory rules and restrictions can influence payout policies of firms in those industries. Our sample consists of an unbalanced panel of 1,650 firms and 6,982 firm-year observations. The number of firm-year observations for each country varies and the majority of the observations come from the UK. To be specific, there are 5,208 firm-year observations from the UK, 899 firm-year observations from France, 309 firm-year observations from Germany, 273 firm-year observations from the Netherlands, 232 firm-year observations from Italy, and 61 firm-year observations from Spain.¹⁸

4. Variable definitions

4.1. Payout variables

Payout to shareholders can be either cash dividends or stock repurchases. In this paper, we focus on dependent variables that are based on cash dividends, stock repurchases, and total payout, defined as the sum of dividends and stock repurchases. Following previous literature (e.g., Fenn and Liang, 2001; Kahle, 2002; Grullon and Michaely, 2002), we scale our payout variables by market value of equity.¹⁹ We also use dependent binary variables that

¹⁸ Although Boardex provides data for other European countries, we prefer concentrating only on the six countries with the largest GDPs in order to avoid using data for countries with very few firm-years.

¹⁹ For robustness tests, we also use payout variables scaled by earnings and total assets. Our results remain qualitatively similar.

are set to one if payout (dividend, repurchase or total payout) is positive and to zero otherwise. As additional payout variable we use the ratio of stock repurchases to total payout.

Panel A of Table 1 contains detailed descriptions of the payout variables. CEO and executive stock options and stock ownership variables are defined in Panel B of Table 1, while Panel C of Table 1 reports definitions for the control variables used in our empirical analysis.²⁰

4.2. CEO and executive stock-based incentives

In this study, CEO and executive stock-based incentives are measured using holdings of stocks, restricted stocks, and stock options. Further, different from prior studies on payout policy and executive incentives, we also use stock options delta and stock-based pay-performance sensitivity. For a particular firm-year, the CEO is defined as the top executive (generally the CEO, the Executive Chairman or the MD) with the largest total compensation within the firm. CEO stock option holdings are calculated as the sum of stock options held divided by the total number of shares outstanding. CEO stock options delta is the sum of the deltas of the options owned by the CEO over the total number of shares outstanding. CEO stock ownership is computed as the number of shares (excluding options) that the CEO owns divided by the total number of shares outstanding. The stock-based pay-performance sensitivity for a CEO is the sum of the shares held by the CEO, the CEO's restricted stocks, and the deltas of all the options the CEO owns, all scaled by the number of shares outstanding.²¹ Since other top executives, besides the CEO, are likely to set or, at least, influence a company's payout policy, we also build stock option and ownership variables using the total numbers of options and shares held by all the executive directors together.

²⁰ It is worth mentioning that we winsorize 1% (0.5% in each tail of the distribution) of the observations of all the non-binary dependent and independent variables in order to reduce the impact of outliers on our findings.

²¹ Stock-based pay-performance sensitivity as a measure of executive incentives has also been used by Datta et al. (2009) and Conyon and Murphy (2000).

Further, we create CEO and executive option measures for exercisable, non-exercisable, in-the-money, and out-of-the-money options.

Since stock and options held by an executive at the end of a fiscal year may affect the executive's payout decisions during the subsequent year, in our models we use lagged values of the executive incentives variables as determinants of payouts. Precise definitions of the all the incentives variables are presented in Panel B of Table 1.

4.3. Other firm-specific characteristics

Following previous research, we control for standard payout determinants such as operating income, growth opportunities, firm size, leverage, retained earnings, cash holdings, volatility of operating income, volatility of stock return, and past firm stock return. Further, we complement this standard set of controls with a dividend tax penalty variable, the fraction of shares that are closely held, institutional ownership, two board characteristics variables, i.e. board size and fraction of independent directors, and a dummy for technology firms. We use lagged values of these independent variables to mitigate potential reverse causality and endogeneity biases. Detailed descriptions of these control variables can be found in Panel C of Table 1.

We expect operating income scaled by total assets to be positively related to payouts since more profitable firms can distribute more cash through dividends and repurchases. We control for growth opportunities, defined as the market-to-book ratio, because companies with more available investment opportunities are less likely to use cash through payouts. Firm size, measured as the natural logarithm of the real value of total assets (in thousands of Great British Pounds), is used as a proxy for external financing costs (e.g., Fenn and Liang, 2001; Cuny et al., 2009). If we assume that external financing costs are lower for larger firms, then payouts would be positively related to size.

Leverage, proxied by the book value of liabilities divided by the market value of assets, can also have an impact on a firm's payout decision. High levels of leverage can signal the presence of financial distress. We would expect that firms with high levels of leverage experience high financing costs. Further, leverage can act as a substitute for payouts to shareholders as it can alleviate the agency costs of free cash flow. Thus, firms with high leverage may tend to pay out less in the form of dividends or share repurchases. According to this view, leverage and payouts in the form of dividends or share repurchases can be substitutes for curbing executive incentives to predate, and a negative relationship between cash dividends or share repurchases and leverage is predicted. Additionally, higher leverage might simply proxy for more credible, more stable, and more profitable firms that can afford to pay dividends and do share repurchases. This view implies that leverage and payouts will be complements so a positive relationship between payouts and leverage should be observed.

DeAngelo et al. (2006) suggest that earned capital can be a proxy for the life cycle stage at which a firm currently finds itself since it can measure the extent to which the firm is self-financing or relying on external capital resources. Thus, a firm with low retained earnings would be expected to be in capital infusion stage, while a firm with high retained earnings would be more mature with considerable level of cumulative profits, and thereby, it would be self-financing and likely to pay dividends. Eije and Megginson (2008) find that the fraction of retained earnings in a European firm's total equity is not significantly correlated with the likelihood to pay cash dividends, which is contrary to U.S. evidence shown in DeAngelo et al. (2006) and international evidence presented in Denis and Osobov (2008). Following prior studies, we use the fraction of retained earnings relative to total book equity to test whether this life-cycle variable explains cross-sectional variation in the level of dividend payments and share repurchases.

We control for cash holdings scaled by total assets. Cash-rich firms are more likely to engage in dividend payments and stock repurchases than counterparts with smaller piles of cash. Another significant determinant of payout policy is the volatility of firm performance (e.g., Jagannathan et al., 2000; Grullon and Michaely, 2002; Chay and Suh, 2009). We contend that such volatility should be negatively associated with the amount of cash that is paid out. Moreover, when choosing between dividends and repurchases, more volatile performance should increase firm propensity to opt for the more flexible repurchases. We use two measures of firm performance volatility: the volatility of operating income and the volatility of stock return. We also attempt to control for recent market conditions by adding the lagged stock return to the set of controls.

Distributing cash through repurchases rather than paying dividends may be more tax-efficient for shareholders. The tax rate paid by shareholders on capital gains may, in fact, be smaller than that on dividend payments. Also, unlike taxes on dividends, taxes on capital gains are paid only on the gains made (not on all the cash that is used in the repurchase transaction), as long as they are positive. It is, of course, possible that a lower tax rate on dividend payments makes such distributions more tax-efficient than stock repurchases. In order to control for the differential tax treatments of dividends and repurchases, we add the dividend tax penalty variable developed by Jacob and Jacob (2013).

Since managerial opportunistic behaviour may be curbed by large blockholders, we control for the impact of concentrated share ownership by including the fraction of shares that are closely held in our regressions. This variable has been used in previous studies of international corporate payout practices and executive compensation (e.g., Chay and Suh, 2009; Fernandes et al., 2013). Institutional shareholders may also influence payout decisions of executives (Short et al., 2002). Thus, we control for the fraction of shares held by

institutional investors in our empirical analyses. We also include board size and fraction of independent directors as control variables measuring corporate governance features.

Since technology firms may pursue payout and executive compensation policies that could be different from those followed in other industries, we add a dummy variable that identifies these firms. Finally, in all regression models we include industry, year, and country dummies. For brevity, we do not report coefficients for these controls are not reported in the tables.

5. Descriptive statistics and empirical results

5.1. Descriptive statistics

Table 2 reports summary statistics for payout, executive incentives, and other firm-specific variables for European firms. The average (median) value for the ratio of dividend payments to market value is 2.56 (1.87) %. Further, the average ratio of share repurchases to market value is 0.67% and total payouts average 3.34 % of market value. Finally, the average (median) value of the ratio between share repurchases and total payout is 14.42 (0) %. The mean value for the dummy variable identifying dividend-paying firms is 69.4 %, suggesting that the majority of the firms in our sample pay dividends. Further, the mean for the share repurchase dummy is only 26.4 %, indicating that a relatively lower fraction of our sample firms make share repurchases.

Panel B of Table 2 reports descriptive statistics for executive and CEO incentive variables. CEOs, on average, own 3.6% of the shares in their firms, while average executive stock ownership is 6.3%. The median for CEO (executive) stock ownership is 0.14 (0.44) %. The average CEO (executive) stock option holding is 0.6 (1.2) %, which is lower than the average CEO (executive) stock ownership. Both for the CEO and for all the executive directors there are more exercisable options than non-exercisable options. Similarly, in-the-

money option holdings are larger than out-of-the-money option holdings. The average CEO (executive) stock options delta is 0.44% (0.87%). We observe that average CEO (executive) stock-based pay-performance sensitivity is 4.24% (7.48%).

Panel C of Table 2 reports descriptive statistics for firm-specific control variables (including institutional ownership and closely held shares) that have been shown to influence firm payout decisions.

5.2. Executive stock incentives and payout likelihood

Table 3, Panel A reports the results of our logit regression model for the probability of dividend payments. We define our dependent variable as a binary variable having a value of one for dividend payers and zero otherwise. We examine whether the probability of a dividend payment is related to CEO and executive incentives. Our results show that both CEO and executive stock-based pay-performance sensitivity and stock ownership have a significant and positive impact on the likelihood that a firm pays dividends. Thus, the findings are consistent with La Porta et al.'s (2000) outcome model. Managerial equity-based compensation and share ownership seem to align the interests of managers with those of shareholders. In terms of economic significance, findings from columns III and IV indicate that a standard deviation change in CEO (executive) stock ownership boosts the likelihood of a dividend payment by $0.09 \times 0.379 = 0.03$ ($0.1269 \times 0.429 = 0.05$).

In contrast, we observe that the coefficient estimates for both CEO and executive stock option holdings and stock options delta are negative and significant, suggesting that as CEOs and executives accumulate more stock option holdings they are less likely to pay dividends. If CEO (executive) stock options delta increases by a standard deviation, the probability of a dividend payment declines by $0.0087 \times 6.483 = 0.06$ ($0.0147 \times 4.541 = 0.07$). A standard deviation increase in CEO (executive) stock option holdings is associated with a $0.0107 \times 3.418 = 0.04$ ($0.0189 \times 2.601 = 0.05$) decline in the likelihood of dividend payments.

This finding provides further support for Lambert et al. (1989) and Fenn and Liang (2001) that stock option holdings lead to a decline in dividend payments. Thus, when executives do not have dividend protection for their stock option holdings, they become reluctant to pay dividends that would have a negative effect on the value of their options.

Furthermore, the results in Table 3, Panel B show that CEO and executive stock option holdings and stock options delta do not have a significant impact on firms' likelihood of making share repurchase. Thus our results suggest that executives do not increase their share repurchases as their stock option holdings increase. Among the CEO and executive incentive measures we use in our analysis, only executive stock-based pay-performance sensitivity and executive stock ownership have a significant and positive impact on the probability of a share repurchase. Panel C of Table 3, reports logit regression results for the probability of a payout, i.e. paying dividends and/or making share repurchases. Consistent with the results in Panel A and Panel B, we observe that higher CEO and executive stock option holdings and stock options delta reduce the likelihood of a payout, while higher CEO and executive stock ownership and pay-performance sensitivity increase firms' likelihood of a payout.

Given that UK firms constitute a high fraction of our sample, in untabulated analyses we test whether there might be a difference between UK and continental European firms in the way CEO and executive stock option holdings and stock ownership could influence firms' likelihood of paying a dividend or doing a share repurchase. We re-estimate the models of Table 3 adding interaction terms between incentive variables and a dummy for continental European firms. We observe that the only statistically significant difference between UK and continental European firms is that the relationship between the probability of a dividend payment and executive stock ownership is weaker in continental firms.

5.3. Executive stock incentives and the level of payout

Table 4 reports estimation results concerning the impact of CEO and executive incentives on the level of dividend payments, share repurchases, and total payout. The one – sided tobit regression model, which is censored at zero, is used when the dependent variables are dividend, share repurchase, and total payout yields. We use the two-sided tobit regression model, which is censored at zero and 100, for the ratio between share repurchases and total payout. The findings on the relationship between executive stock-based pay-performance sensitivity and stock ownership and the level of dividend payments are quite mixed. As reported in Table 4, Panel A, we do not find any significant impact of CEO stock-based pay-performance sensitivity and share ownership on the level of dividend payments. However, the marginal effects for executive stock-based pay-performance sensitivity and executive stock ownership are positive and statistically significant. A one standard deviation increase in executive stock-based pay-performance sensitivity (stock ownership) is associated with a $0.1299 \times 0.719 = 0.09$ ($0.1269 \times 1 = 0.13$) change in the dividend yield. Thus, some of our tobit results are consistent with the logit findings from Table 3 and support the notion that higher executive pay-performance sensitivity and stock ownership by executives can incentivise the payment of dividends.

Panel A of Table 4 reports that both CEO and executive stock options delta and stock option holdings have a significant and negative impact on the level of dividend payments. This finding is consistent with the results from Table 3. As CEOs and executives accumulate more share option holdings, they become more reluctant to make dividend payments that could reduce the values of their options that are not dividend-protected. In terms of economic significance, when CEO (executive) stock options delta increases by one standard deviation, the dividend yield declines by $0.0087 \times 38.73 = 0.34$ ($0.0147 \times 24.46 = 0.36$). A one standard deviation increase in CEO (executive) stock option holdings is associated with a

$0.0107 \times 19.18 = 0.2$ ($0.0189 \times 11.71 = 0.22$) reduction in the dividend yield. For comparison, in Fenn and Liang (2001), when stock option holdings by executive officers increase by one standard deviation the dividend yield decreases by 0.38.

However, as we observe in Table 4, Panel B, stock option holdings by CEO and executives do not seem to have a significant impact on the level of share repurchases made. Again, this finding is consistent with the results from the logit regressions in Panel B of Table 3. In Panel B of Table 4, we, in fact, observe that the marginal effects for CEO and executive stock options delta and stock option holdings are positive but not statistically significant. This finding suggests that higher levels of executive stock options do not lead companies to repurchase more stock in order to fund the increased use of stock option plans and/or, simply, replace the dividend payments that could lead to a reduction in the value of the executive options. Furthermore, executive stock-based pay-performance sensitivity and shares held by executives have a positive and significant impact on the level of share repurchases. Overall, higher levels of executive (but not CEO) stock-based pay-performance sensitivity and stock ownership seem to help align the interests of the shareholders with those of the executives, leading to higher dividend payments and share repurchases.

Table 4, Panel C report the estimation results for total payout. We observe that both CEO and executive stock options delta and stock option holdings have a negative and significant impact on total payout. Our findings confirm the conclusions we have drawn above: managers reduce dividend payments as they accumulate more stock option holdings without sufficiently increasing share repurchases to maintain the same level of total payout. The regression results in Table 4, Panel D provide further support for this finding. We observe that the marginal effects for both CEO and executive stock options delta and stock option holdings are positive and statistically significant in the regressions of the fraction of

share repurchases in total payout. On the other hand, CEO and executive stock-based pay-performance sensitivity and stock ownership do not have a significant impact on this fraction.

Given that our sample is dominated by a relatively large number of UK firms, we test whether our results for continental European firms would differ from those for UK firms. Thus, in untabulated analyses, we add interaction terms between incentive variables and a dummy for continental European firms to all the regression models of Table 4. The results of these analyses show that the positive effect of executive stock ownership on the dividend yield seems much weaker in continental Europe. More importantly, we observe that the marginal effects for the interaction terms between the dummy for continental European firms and all stock options delta and stock option holdings variables are positive and statistically significant at standard levels. Thus, our findings suggest that CEO and executive stock options seem to lead to an increase in share repurchases in continental European firms but not in UK firms. One characteristic of the UK that is different from our sample of continental European countries is that until December, 2003, the UK company law obliged firms to cancel all repurchased stock. Thus, UK firms would not be able to use share repurchases as a way to fund executive or employee stock options. Further, Young and Yang (2011) report that even after December 2003 repurchased shares were often still cancelled by UK firms. Our finding of an insignificant impact of stock option holdings on share repurchases for the UK firms can be interpreted as reflecting the effect of this company law and UK corporate practices.

5.4. Stock options characteristics and payout policy

As explained in Section 2.3., we expect exercisable (in-the-money) stock options to affect dividends and stock repurchases to a larger extent than non-exercisable (out-of-the-

money) options. In Tables 5 and 6 we report estimates for logit and tobit regression models that allow us to investigate whether our expectations are confirmed.²²

In Tables 5, the evidence on the different impacts of exercisable and non-exercisable stock options is quite clear-cut. Only holdings of exercisable stock options by CEOs and other executives influence payouts in a statistically significant way. CEO and executive exercisable stock option holdings are negatively associated with the likelihood and magnitude of cash dividends and overall payouts, and positively related to the fraction of share repurchases in total payout. The economic significance of the marginal effects for exercisable stock options is noteworthy. When CEO (executive) exercisable option holdings increase by one standard deviation, the probability of a dividend payment declines by $0.0073 \times 5.146 = 0.04$ ($0.0123 \times 4.333 = 0.05$) whereas the dividend yield is reduced by $0.0073 \times 33 = 0.24$ ($0.0123 \times 24.17 = 0.3$). In Sharma's (2011) OLS regressions, a one standard deviation increase in CEO exercisable stock option holdings reduces the dividend yield by $0.014 \times 4.9 = 0.069$.

In contrast, findings are more mixed in Table 6, but there is an overall support for the notion that in-the-money options are more strongly associated with payouts than out-of-the-money options. In columns I and II of Panel A, all CEO and executive stock option variables are found to be negatively related to the likelihood and level of dividend payments. However, marginal effects for in-the-money option variables are larger and more statistically significant than those for corresponding out-of-the-money option variables. Similarly, the marginal effects of CEO and executive stock option holdings in logit and tobit models for total payout

²² In these tables we only consider variables based on stock option holdings since the values of stock option deltas depend on the option characteristics we are trying to investigate and fully reflect such characteristics. Thus, by considering stock options delta variables we would not be able to analyze the different impacts of exercisable (in-the-money) and non-exercisable (out-of-the-money) stock options on payouts. In untabulated regressions, we confirm this and find similar effects on payouts for exercisable (in-the-money) stock options delta and non-exercisable (out-of-the-money) stock options delta.

are more negative and statistically significant when in-the-money options are considered. However, out-of-the-money option holdings seem more significant determinants of the ratio of share repurchases over total payout than in-the-money option holdings (see columns VII and VIII of Table 6, Panel B).

5.5. Endogeneity problem

It is a challenging task to establish a causal link between executive incentives and corporate payout policy. One could argue that the relationship between payout and incentive variables can be influenced by the endogeneity issue. For instance, reverse causality can lead to a negative relationship between dividend payments and executive stock options. As Huddart and Lang (1996) suggest, an increase in dividend payments can lead to an increase in stock prices, which could provide incentives for executives to exercise more stock options and reduce the number of outstanding options. Thus, the effect of dividend payments on stock option exercises could explain the negative relationship between outstanding options and dividends. In our regression analysis, we use lagged values of executive incentive variables, which could alleviate the extent of endogeneity problem. Further, we address the potential endogeneity concerns by using instrumental variables estimation and matching estimation.

An alternative form of endogeneity problem might arise from omitted variables. While we include a comprehensive set of control variables that are shown to influence payout policy by previous researchers, the association we observe between payout policy and executive incentives might be spurious if we omit any variables that influence both payout policy and executive incentives. Thus, we augment our baseline model in Table 3 and Table 4 by including additional control variables, i.e. financial constraints measures (Kaplan and Zingales index (1997), Whited and Wu index (2006), and Hadlock and Pierce index (2010)) and macroeconomic variables (change in industrial production and 3-month interbank interest

rates), which could influence firms' payout decisions and executive incentives.²³ We find that our main results about the impact of executive incentives on payout policy still hold. For the sake of brevity, we do not tabulate these results.

5.5.1. Instrumental variable regressions

We use an instrumental variable estimation technique to investigate whether the potential endogeneity of the incentive variables causes a bias in our results. We follow prior literature to identify potential instruments for CEO incentives and consider CEO age and tenure as instruments (Liu and Mauer, 2011; Brockman et al., 2010; Coles et al., 2006).²⁴ Similarly, average values of executive director age and tenure, and the sums of the ages and tenures of the executives are considered to instrument incentive variables for all the executives. Both average values and sums of ages and tenures could be valid instruments of executive incentive variables since these variables are built by cumulating stock and option holdings across executive directors.

Executive age can be an important determinant of incentive compensation. Various theoretical studies show that managerial age can influence a manager's attitude towards risk.²⁵ Thus, firms consider executive age when they set executive incentives (Gibbons and Murphy, 1992; Zwiebel, 1995; Holmstrom, 1999). For instance, Gibbons and Murphy (1992) argue that younger managers have more career concerns which provide them with incentives to take costly unobservable actions to maximize firm performance. Thus, in their model younger executives need less equity-based compensation than older managers who have fewer career concerns. However, younger managers might have more risk aversion, which induces them to

²³ We extract the data for industrial production and 3-month interbank interest rates from the OECD website.

²⁴ Firm age is also used by the previous researchers as an instrument for director incentives but this variable is missing for a significant fraction of the firms in the Worldscope database, so we could not use it in our analysis. Moreover, firm age may not be a suitable instrument in our study since it may influence payout policy.

²⁵ Serfling (2014) provides a comprehensive list of papers on managerial age and manager's risk preference.

take a more conservative approach in their corporate decision making. Consequently, younger managers are offered more incentives to adopt less conservative policies (Zwiebel, 1995; Holmstrom, 1999). The tenure of a CEO or of another executive can be related to his/her share and option holdings because, all else equal, an executive is likely to accumulate more stock and option holdings over a longer period of time (Ozkan, 2012). Further, more experienced executives are likely to be awarded larger compensation packages including higher levels of equity-based compensation (Ozkan, 2012).²⁶

We use a Wald test of exogeneity to check whether incentive variables are endogenous in our regression models.²⁷ The null hypothesis of this test of exogeneity is that the instrumented variable is exogenous. Further, as in Anantharaman and Lee (2014), we use the Kleibergen-Paap underidentification test to ascertain the validity of our instruments. The null hypothesis in this test is that the instruments are uncorrelated with the endogenous regressors. For each incentive variable, we apply the test to each possible instrument and only retain instrumental variables with a p-value of the test that is lower than 10%. We use the instruments for CEO and executive incentives, i.e. age and/or tenure, that pass the Kleibergen-Paap underidentification test in our instrumental variable regressions. For CEO stock option holdings, no instrument satisfies the Kleibergen-Paap test requirement and we simply use the instrumental variable with the smallest p-value for this test. Thus, instrumental variable regression findings for CEO stock option holdings should be interpreted with caution. Table 7 provides the details on the instruments used for each incentive variable.

²⁶ Similarly to Chava and Purnanandam (2007), as an additional instrument for an incentive variable we also consider the industry average value of the same variable (based on the firm's two-digit SIC code and excluding observations for the firm). However, we find that they are not valid instruments based on the Kleibergen-Paap test.

²⁷ This test is available in Stata 13.

In Table 7, Panel A and B we re-estimate the baseline binary models of Table 3 using instrumental variable probit regressions. Similarly, Panels C to F of Table 7 report the results for instrumental variable tobit regressions of the baseline specifications of Table 4. In each instrumental variable regression, only one incentive variable at a time is assumed to be endogenous.²⁸ We cannot always reject the null hypothesis that the instrumented variable is exogenous (see p-values of exogeneity tests) at a 10% significance level (see, for instance, Panel A, column IX). Since instrumental variable probit and logit estimation would be preferable to regular logit and probit estimation only when the instrumented variable is endogenous, we should not give much weight to the findings of instrumental variable regressions unless the Wald test of exogeneity confirms that endogeneity is present.

In Panels A and B of Table 7, CEO and executive stock options delta and stock option holdings have a negative effect on the likelihoods of dividend payments and of a payout. This result is in line with our findings in Table 3. Further, we find that marginal effects for CEO and executive pay-performance sensitivity and stock ownership are positive, which support our results from Table 3. Similarly, in the remaining panels of Table 7, we find a positive effect of pay-performance sensitivity and stock ownership variables on all the three types of payout yields. In columns V-VIII of Panel C and Panel E, negative and sometimes statistically significant relationships are found between stock option variables and dividend, and total payout yields. However, these findings for stock option holdings are of limited use since the stock option holdings do not seem to be endogenous based on the large p-values of the exogeneity test. In conclusion, the results of the instrumental variable regressions are not at odds with the conclusions that we have drawn from previous empirical analyses.

²⁸ In Table 7, models with CEO (executive) stock ownership as instrumented variable include CEO (executive) stock option holdings as a control variable. However, our findings are qualitatively similar if in these models we use CEO (executive) stock options delta instead of CEO (executive) stock option holdings.

5.5.2. Matching Estimation

Next, we test the robustness of our findings by using matching estimation. In our empirical analysis, we use measures of executive incentives, which are continuous variables rather than binary variables. Thus, we cannot directly use matching estimation methods as in the case of Colak and Whited (2007) and Villalonga (2004) which have endogenous binary explanatory variables. As a first step we transform each continuous incentive variable into a binary incentive variable (the treatment variable) that is set to one for observations with above-median levels of incentives and is set to zero for observations with below-median levels of incentives. Then, we use the bias-corrected nearest-neighbor matching estimator developed by Abadie and Imbens (2011) to estimate the average treatment effects (ATEs) of the binary incentive variables on the outcome variables (the payout variables).²⁹ As highlighted by Abadie and Imbens (2011), matching estimators can reduce biases in ATE estimates when there are some observable confounders that affect both the treatment and the outcome variables. In particular, matching by such confounders allows the researchers to obtain more reliable estimates of the ATEs. Following this argument, as matching variables, we use the complete sets of control variables in the regressions models of Tables 3 and 4 in the paper. For example, when the outcome variable is the dummy for dividends and the treatment binary variable is based on CEO pay-performance sensitivity, the set of matching variables includes all the control variables from *Operating income* to *Technology firm dummy* (together with all the year, country, and industry dummies) in column I of Panel A of Table 3. Similarly, when the outcome variable is the yield for total payout and the binary treatment variable is based on CEO stock ownership, we consider CEO stock option holdings or CEO

²⁹ Stata 13 command *teffects nnmatch* with option *biasadj*.

stock options delta and all the other controls (see columns III and V of Panel C of Table 5) as matching variables.

We report the estimates of all the ATEs in Table 8, Panel A.³⁰ Estimated ATEs for CEO and executive stock option holdings and their corresponding delta variables fully confirm the conclusions drawn in previous parts of the paper. As expected, stock-based pay-performance sensitivity and ownership variables are associated with increases in the likelihoods of payouts. However, stock-based pay-performance sensitivity is associated with declines in payout levels while ownership variables are essentially unrelated to payout yields. In contrast, in Table 4 of the paper, we report positive effects of stock-based pay-performance sensitivity and stock ownership variables on dividend, repurchase, and total payout yields.

We test the robustness of our findings above to changes in the set of matching variables. Following Colak and Whited (2007), we run probit regressions of all the binary treatment variables on all the matching variables used in Table 8, Panel A, in order to identify matching variables that are significant determinants (at least at a 10% level of statistical significance) of the treatment variables. We then replicate the estimations of Table 8, Panel A relying only on matching variables that are statistically significant in the relevant probit models (but always keeping industry, year, and country dummies in the set of matching variables). We report our estimation results in Table 8, Panel B. Our findings remain qualitatively similar to those in Table 8, Panel A. Overall, our matching estimation results are consistent with the regression findings in Table 3 to Table 7. The few discrepancies we highlight between the matching estimator findings and regression findings reported in our

³⁰ For the sake of brevity, the table only reports the ATEs of the binary CEO and executive stock ownership variables based on sets of matching variables comprising CEO and executive stock option holdings, but not the corresponding delta variables. Findings are very similar when the delta variables are used instead.

paper may be due to the transformations of our continuous incentive variables into binary treatment variables that could cause a loss of relevant information.

In sum, our findings from IV estimation, matching estimation, and robustness tests for omitted variables show that our main results about the association between payout policy and executive incentives for our sample of European firms holds. However, we still note that endogeneity problem is a challenging issue in corporate finance that could not be totally ruled out by any empirical test.

6. Conclusion

This study examines the relationship between CEO and executive stock incentives and corporate payout policy for a sample of 6,982 firm-year observations from the UK, France, Germany, Italy, the Netherlands, and Spain over the period 2002 to 2009. We test whether CEO and executive incentives, i.e. stock and option holdings, stock options delta, and stock-based pay-performance sensitivity, influence the level and likelihood of dividend payments and share repurchases. Our aim is to advance our knowledge about how executive incentives influence dividend payments and share repurchases in European countries where previous studies report that there has been a declining (increasing) propensity to pay dividends (share repurchases) and also an increase in convergence of executive compensation packages towards those in the US.

We report a positive relationship between executive stock-based pay-performance sensitivity and holdings of shares by executives and the probability and level of dividend payments and share repurchases. This result highlights the beneficial effect of executive ownership and stock-based pay-performance sensitivity as a mechanism to align managerial and shareholder interests and incentivize executives to disgorge more cash. Further, our results indicate that higher levels of CEO and executive stock option holdings and stock

options delta are related to a lower likelihood and level of dividend payments. These relationships are stronger for exercisable than for non-exercisable options. Further, they are mainly driven by in-the-money rather than out-of-the-money options. Previous researchers, including Fenn and Liang (2001) and Lambert et al. (1989), report that companies with executive stock options cut down dividend payments and replace dividends with share repurchases. In contrast, in our study, we observe that an increase in CEO and executive stock options lead to an overall decline in total payout levels. Finally, we show that the fraction of share repurchases relative to total payout increases as CEO and executive stock option holdings and stock options delta increase. These findings can be explained by the negative impact of CEO and executive stock options on dividend payments.

Our results provide important policy implications for regulators in Europe and beyond. It has long been argued that regular dividend payments and, more generally, payouts are important corporate governance mechanisms that can attenuate agency conflicts and the cash flow problem (Easterbrook, 1984; Jensen, 1986). As documented in this study, executive stock options from our sample firms of European countries are not dividend protected. This circumstance probably leads to reductions in dividend payments that are not fully compensated by increases in repurchase activities. In contrast, Liljeblom and Pasternack (2006) find that Finnish companies with larger executive option plans pay higher, not lower, dividends if their options are dividend-protected. Thus, regulations that oblige or at least incentivize firms to use dividend protected option plans could reduce distortions in dividend policy caused by selfish managerial behaviour.

APPENDIX

Executive incentives and stock market reactions to share repurchase announcements

We also test whether market participants take into account the potential impact of executive incentives on share repurchases, when they react to firm's share repurchase decisions. Thus, we obtain data on stock repurchase announcements from the Thomson SDC (Securities Data Corporation) for the European firms in our sample during the period 2002-2009.³¹ This database has been commonly used in the share repurchase literature (Manconi et al., 2013; Rau and Vermaelen, 2002). However, one major weakness of share repurchase announcement data from SDC is that SDC understates open market share repurchase activity in Europe. Oswald and Young (2004) compare SDC share repurchase data for UK firms with those data collected from the London Stock Exchange Regulatory News Service, The Financial Times, and firms' published financial statements. They report that the number of open market repurchase announcements reported by these sources exceeds the number of announcements from SDC by more than one hundred percent. Further, they document that the value of actual share repurchases exceeds the SDC figure by almost four hundred percent.

For our sample of European firms, we obtain 135 share repurchase announcements from the SDC. This sample size might be an understatement of share buyback activity in our sample of European firms. Following Brown and Warner (1985) we compute three measures of cumulative abnormal returns, i.e. CAR (0), CAR (-1; 0), and CAR (-1; +1) using the market model and an estimation period of (-244; -6).³²

³¹ We applied the following criteria to select the final sample of announcements: a) the event is an announcement by the Board of Directors of the approval of a repurchase program; b) the approved repurchase program would allow the firm to repurchase stock either on the open market or through a self-tender offer; c) the event takes place in the period 2002-2009; d) data for the variables used in our study must be available for the year of the announcement.

³² We choose the following market indices: FTSE All-Share (UK), CDAX (Germany), CAC All-Tradable (France), FTSE MIB (Italy), AEX All-Share (Netherlands), and IGBM (Spain).

Executives may announce share repurchase programs to enrich themselves rather than increase shareholder wealth. Market reactions could be weaker, i.e. CARs can be smaller, if market participants interpret a share repurchase announcement as a signal of executives' self-interest of maintaining the value of their stock option holdings. Thus, we test whether CEO and executive stock options delta and stock option holdings are significant determinants of our three CAR variables. For brevity, we do not present our results, but they are available upon request. Overall, we do not observe any statistically significant relationships between CARs and our CEO and executive incentive variables.³³ We can note that our finding of an insignificant impact of executive incentives on CARs is not surprising given the regulatory rules about share repurchases in Europe. While in the U.S. management needs only the approval of the board of directors for a share buyback program, in European firms shareholder approval is required to authorize such transaction. Thus, managers in European firms can make routine requests for share repurchases since it can be considerably expensive to arrange a special shareholders' meeting to have an authorization for a share buyback (Manconi et al, 2013). As a consequence, the market reaction to a share repurchase announcement might be low since market participants could view a share repurchase announcement as a routine request of management for a shareholder approval.

³³ We also test whether stock-based pay-performance sensitivity and stock ownership might have an impact on CARs, but we do not find any significant impact.

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Table 1
Variable definitions.

Panel A: Payout variables	
<i>Variable</i>	<i>Definition</i>
<i>Dividends / market value</i>	Common dividends paid (item WC05376) over firm market capitalization (item WC08001), times 100
<i>Dummy dividends</i>	Binary variable that equals one if <i>dividends / market value</i> is positive, otherwise it is set to zero
<i>Share repurchases / market value</i>	Cash paid out through repurchases (item WC04751) over firm market capitalization (item WC08001), times 100
<i>Dummy repurchases</i>	Binary variable that equals one if <i>share repurchases / market value</i> is positive, otherwise it is set to zero
<i>Total payout / market value</i>	Sum of <i>dividends / market value</i> and <i>share repurchases / market value</i>
<i>Dummy payouts</i>	Binary variable that equals one if <i>total payout / market value</i> is positive, otherwise it is set to zero
<i>Share repurchases / total payout</i>	Cash paid out through repurchases (item WC04751) over total payout (if positive), times 100
Panel B: Incentive variables	
<i>Variable</i>	<i>Definition</i>
<i>CEO stock ownership</i>	Common shares held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>CEO stock options delta</i>	Sum of the deltas of options on common stock held by the CEO at the end of the previous fiscal year over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000). Deltas are calculated following the Black-Scholes model. Except for the risk-free rate, the stock return volatility, and the dividend yield, all variables used to compute the option deltas are from Boardex. The time-to-exercise is assumed to be equal to the time-to-maturity of the option. In the infrequent cases when this variable is not available, it is assumed to be five years. The risk-free rate is the rate on Government bonds with a time-to-maturity that matches the time-to-maturity of the option (source: Datastream). The annualized stock return volatility is computed using monthly returns over the previous five years (source: Datastream). At least twelve monthly returns must be non-missing to compute this variable. The dividend yield is based on the average value of <i>dividends / market value</i> over the past three years. At least one observation of this variable must be non-missing to calculate the dividend yield
<i>CEO stock-based pay-performance sensitivity</i>	Sum of <i>CEO stock ownership</i> , <i>CEO stock options delta</i> , and restricted stocks held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>CEO stock option holdings</i>	Common shares underlying options held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>CEO exercisable option holdings</i>	Common shares underlying exercisable options held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)

<i>CEO non-exercisable option holdings</i>	Common shares underlying non-exercisable options held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>CEO in-the-money option holdings</i>	Common shares underlying in-the-money options held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>CEO out-of-the-money option holdings</i>	Common shares underlying out-of-the-money options held by the CEO at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive stock ownership</i>	Common shares held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive stock options delta</i>	Sum of the deltas of options on common stock held by all the executive directors at the end of the previous fiscal year over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000). Deltas are calculated following the Black-Scholes model. Except for the risk-free rate, the stock return volatility, and the dividend yield, all variables used to compute the option deltas are from Boardex. The time-to-exercise is assumed to be equal to the time-to-maturity of the option. In the infrequent cases when this variable is not available, it is assumed to be five years. The risk-free rate is the rate on Government bonds with a time-to-maturity that matches the time-to-maturity of the option (source: Datastream). The annualized stock return volatility is computed using monthly returns over the previous five years (source: Datastream). At least twelve monthly returns must be non-missing to compute this variable. The dividend yield is based on the average value of <i>dividends / market value</i> over the past three years. At least one observation of this variable must be non-missing to calculate the dividend yield
<i>Executive stock-based pay-performance sensitivity</i>	Sum of <i>executive stock ownership</i> , <i>executive stock options delta</i> , and restricted stocks held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive stock option holdings</i>	Common shares underlying options held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive exercisable option holdings</i>	Common shares underlying exercisable options held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive non-exercisable option holdings</i>	Common shares underlying non-exercisable options held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive in-the-money option holdings</i>	Common shares underlying in-the-money options held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)
<i>Executive out-of-the-money option holdings</i>	Common shares underlying out-of-the-money options held by all the executive directors at the end of the previous fiscal year (source: Boardex) over the number of common shares outstanding on the same date (item WC05301 times item WC05576 times 1000)

Panel C: Other firm-specific variables

<i>Variable</i>	<i>Definition</i>
<i>Operating income</i>	Lagged value of operating income plus depreciation and amortization (item WC018155), over total assets (item WC02999)

<i>Growth opportunities</i>	Lagged value of total assets (item WC02999) minus book value of equity plus firm market capitalization (item WC08001), over total assets. Book value of equity is defined as total assets minus total liabilities (item WC03351) minus preferred stock (item WC03451, if available)
<i>Firm size</i>	Lagged value of the natural logarithm of the real value of total assets (item WC02999) expressed in thousands of GBP. Real values are computed using CPI index data with 2008 as base year
<i>Leverage</i>	Lagged value of total liabilities (item WC03351), over total assets (item WC02999) minus book value of equity plus market capitalization (item WC08001). Book value of equity is defined as total assets minus total liabilities (item WC03351) minus preferred stock (item WC03451, if available)
<i>Retained earnings</i>	Lagged value of retained earnings (item WC03495) over book value of equity. Book value of equity is defined as total assets minus total liabilities (item WC03351) minus preferred stock (item WC03451, if available)
<i>Cash</i>	Lagged value of cash and equivalents (item WC02001) over total assets (item WC02999)
<i>Volatility of operating income</i>	Standard deviation of <i>operating income</i> in the past four fiscal years (excluding the current year)
<i>Volatility of stock return</i>	Standard deviation of monthly stock returns (source: Datastream) in the past two fiscal years (excluding the current year)
<i>Stock return</i>	Firm stock return (source: Datastream) in the previous fiscal year
<i>Dividend tax penalty</i>	Lagged value of the dividend tax penalty variable from equation (1) and Table 2 of Jacob and Jacob (2013)
<i>Closely held shares</i>	Lagged value of the percentage of shares that are closely held (item WC05475)
<i>Institutional ownership</i>	Lagged value of the fraction of shares held by institutional investors (source: Thomson One)
<i>Board size</i>	Lagged number of executive and non-executive directors (source: Boardex)
<i>Board independence</i>	Lagged value of the ratio between the number of independent non-executive directors and <i>board size</i> , times 100 (source: Boardex)
<i>Technology firm</i>	Binary variable that is set one for firms with a three-digit SIC code (item WC07021) that is either 283, 357, 366, 367, 381, 382, 383, 384, 737, 873, or 874

Table 2

Descriptive statistics for payout, incentive, and other firm-specific variables.

Panel A: Payout variables				
	Obs.	Mean	Median	Std. Dev.
<i>Dividends / market value</i>	6,982	2.5635	1.8675	3.2032
<i>Dummy dividends</i>	6,982	0.6936	1	0.461
<i>Share repurchases / market value</i>	6,982	0.6679	0	2.1599
<i>Dummy repurchases</i>	6,982	0.2645	0	0.4411
<i>Total payout / market value</i>	6,982	3.3429	2.1655	4.6199
<i>Dummy payouts</i>	6,982	0.7276	1	0.4452
<i>Share repurchases / total payout</i>	5,080	14.4284	0	27.5735
Panel B: Incentive variables				
	Obs.	Mean	Median	Std. Dev.
<i>CEO stock-based pay-performance sensitivity</i>	6,982	0.0424	0.0073	0.0908
<i>Executive stock-based pay-performance sensitivity</i>	6,982	0.0748	0.0169	0.1299
<i>CEO stock ownership</i>	6,982	0.0365	0.0014	0.0902
<i>Executive stock ownership</i>	6,982	0.0632	0.0044	0.1269
<i>CEO stock options delta</i>	6,982	0.0044	0.0006	0.0087
<i>CEO stock option holdings</i>	6,982	0.006	0.0011	0.0107
<i>CEO exercisable option holdings</i>	6,982	0.003	0	0.0073
<i>CEO non-exercisable option holdings</i>	6,982	0.0028	0	0.0064
<i>CEO in-the-money option holdings</i>	6,982	0.0034	0	0.0079
<i>CEO out-of-the-money option holdings</i>	6,982	0.0025	0	0.0064
<i>Executive stock options delta</i>	6,982	0.0087	0.0023	0.0147
<i>Executive stock option holdings</i>	6,982	0.0123	0.0042	0.0189
<i>Executive exercisable option holdings</i>	6,982	0.006	0.0007	0.0123
<i>Executive non-exercisable option holdings</i>	6,982	0.006	0.0003	0.0118
<i>Executive in-the-money option holdings</i>	6,982	0.0069	0.0005	0.0135
<i>Executive out-of-the-money option holdings</i>	6,982	0.0051	0	0.0114
Panel C: Other variables				
	Obs.	Mean	Median	Std. Dev.
<i>Operating income</i>	6,982	0.0795	0.1086	0.1688
<i>Growth opportunities</i>	6,982	1.7463	1.3821	1.1671
<i>Firm size</i>	6,982	12.2923	12.1538	2.2903
<i>Leverage</i>	6,982	0.3818	0.3699	0.2128
<i>Retained earnings</i>	6,982	-0.4652	0.2578	2.9247
<i>Cash</i>	6,982	0.1545	0.0937	0.1736
<i>Volatility of operating income</i>	6,982	0.0653	0.0284	0.1161
<i>Volatility of stock return</i>	6,982	0.1224	0.1063	0.0649
<i>Stock return</i>	6,982	0.0942	0.0543	0.5365
<i>Dividend tax penalty</i>	6,982	-0.1205	-0.25	0.1809
<i>Closely held shares</i>	6,982	32.3395	29.22	23.4206
<i>Institutional ownership</i>	6,982	0.4338	0.4103	0.2807
<i>Board size</i>	6,982	8.2582	7	3.8309
<i>Board independence</i>	6,982	56.4545	57.1429	17.1837
<i>Technology firm</i>	6,982	0.2289	0	0.4201

Detailed variable definitions can be found in Table 1.

Table 3
Logit models: baseline regressions.

Panel A: <i>Dummy dividends</i>	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock-based pay-performance sensitivity</i>	0.346** (2.155)					
<i>Executive stock-based pay-performance sensitivity</i>		0.313** (2.499)				
<i>CEO stock ownership</i>			0.379** (2.279)		0.402** (2.399)	
<i>Executive stock ownership</i>				0.429*** (3.254)		0.431*** (3.266)
<i>CEO stock options delta</i>			-6.483*** (-3.585)			
<i>Executive stock options delta</i>				-4.541*** (-4.580)		
<i>CEO stock option holdings</i>					-3.418** (-2.266)	
<i>Executive stock option holdings</i>						-2.601*** (-3.247)
<i>Operating income</i>	2.494*** (9.993)	2.487*** (9.897)	2.480*** (9.887)	2.466*** (9.737)	2.483*** (9.945)	2.472*** (9.801)
<i>Growth opportunities</i>	-0.0333 (-1.571)	-0.0334 (-1.573)	-0.0339 (-1.572)	-0.0348 (-1.599)	-0.0346 (-1.619)	-0.0366* (-1.696)
<i>Firm size</i>	0.0649*** (4.571)	0.0658*** (4.630)	0.0540*** (3.802)	0.0525*** (3.689)	0.0559*** (3.876)	0.0537*** (3.743)
<i>Leverage</i>	-0.149 (-1.620)	-0.146 (-1.583)	-0.154* (-1.673)	-0.161* (-1.750)	-0.141 (-1.521)	-0.143 (-1.545)
<i>Retained earnings</i>	0.0783*** (3.207)	0.0782*** (3.216)	0.0762*** (3.256)	0.0748*** (3.344)	0.0768*** (3.221)	0.0756*** (3.291)
<i>Cash</i>	-0.194* (-1.717)	-0.191* (-1.685)	-0.214* (-1.871)	-0.213* (-1.879)	-0.211* (-1.857)	-0.209* (-1.840)
<i>Volatility of operating income</i>	-1.690*** (-5.677)	-1.689*** (-5.610)	-1.606*** (-5.656)	-1.565*** (-5.462)	-1.636*** (-5.684)	-1.603*** (-5.532)
<i>Volatility of stock return</i>	-3.292*** (-12.50)	-3.297*** (-12.50)	-3.272*** (-12.50)	-3.268*** (-12.49)	-3.287*** (-12.54)	-3.282*** (-12.55)
<i>Stock return</i>	0.0324* (1.687)	0.0325* (1.693)	0.0463** (2.380)	0.0487** (2.506)	0.0394** (2.058)	0.0423** (2.200)
<i>Dividend tax penalty</i>	-0.157 (-1.087)	-0.150 (-1.041)	-0.193 (-1.342)	-0.189 (-1.325)	-0.172 (-1.194)	-0.167 (-1.165)
<i>Closely held shares</i>	-6.69e-05 (-0.0944)	-0.000238 (-0.333)	-0.000276 (-0.394)	-0.000536 (-0.762)	-0.000250 (-0.355)	-0.000518 (-0.732)

<i>Institutional ownership</i>	-0.0202 (-0.297)	-0.0100 (-0.147)	-0.0243 (-0.357)	-0.0118 (-0.174)	-0.0192 (-0.283)	-0.00742 (-0.109)
<i>Board size</i>	0.0109* (1.870)	0.0102* (1.752)	0.0109* (1.918)	0.0124** (2.148)	0.0111* (1.925)	0.0123** (2.111)
<i>Board independence</i>	-0.00206* (-1.940)	-0.00169 (-1.559)	-0.00158 (-1.514)	-0.00156 (-1.455)	-0.00167 (-1.593)	-0.00158 (-1.463)
<i>Technology firm</i>	0.0711 (1.547)	0.0724 (1.572)	0.0712 (1.539)	0.0719 (1.552)	0.0706 (1.525)	0.0717 (1.543)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.521	0.521	0.526	0.529	0.523	0.526

Panel B: <i>Dummy repurchases</i>						
	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock-based pay-performance sensitivity</i>	0.0451 (0.574)					
<i>Executive stock-based pay-performance sensitivity</i>		0.153** (2.248)				
<i>CEO stock ownership</i>			0.0299 (0.376)		0.0315 (0.395)	
<i>Executive stock ownership</i>				0.137** (1.992)		0.137** (1.995)
<i>CEO stock options delta</i>			0.00566 (0.00490)			
<i>Executive stock options delta</i>				-0.210 (-0.298)		
<i>CEO stock option holdings</i>					0.143 (0.155)	
<i>Executive stock option holdings</i>						-0.0793 (-0.145)
<i>Operating income</i>	0.686*** (8.340)	0.680*** (8.257)	0.686*** (8.216)	0.677*** (8.078)	0.687*** (8.259)	0.678*** (8.124)
<i>Growth opportunities</i>	-0.00599 (-0.538)	-0.00665 (-0.593)	-0.00595 (-0.534)	-0.00653 (-0.582)	-0.00594 (-0.534)	-0.00658 (-0.587)
<i>Firm size</i>	0.0448*** (7.317)	0.0453*** (7.403)	0.0447*** (7.127)	0.0444*** (7.030)	0.0449*** (7.094)	0.0446*** (6.969)
<i>Leverage</i>	-0.0874* (-1.718)	-0.0884* (-1.733)	-0.0875* (-1.719)	-0.0886* (-1.735)	-0.0877* (-1.723)	-0.0882* (-1.727)
<i>Retained earnings</i>	1.50e-05 (0.00388)	-0.000346 (-0.0906)	3.81e-05 (0.00991)	-0.000358 (-0.0941)	5.50e-05 (0.0143)	-0.000341 (-0.0896)
<i>Cash</i>	0.289*** (5.248)	0.284*** (5.184)	0.290*** (5.252)	0.284*** (5.166)	0.290*** (5.255)	0.284*** (5.171)
<i>Volatility of operating income</i>	-0.329** (-2.245)	-0.337** (-2.293)	-0.328** (-2.248)	-0.327** (-2.253)	-0.330** (-2.256)	-0.330** (-2.266)
<i>Volatility of stock return</i>	-0.904*** (-5.964)	-0.908*** (-5.989)	-0.903*** (-5.966)	-0.905*** (-5.980)	-0.904*** (-5.971)	-0.905*** (-5.990)
<i>Stock return</i>	0.0181 (1.477)	0.0177 (1.442)	0.0182 (1.472)	0.0187 (1.511)	0.0180 (1.465)	0.0184 (1.486)
<i>Dividend tax penalty</i>	0.121 (1.551)	0.123 (1.573)	0.121 (1.549)	0.124 (1.571)	0.122 (1.555)	0.124 (1.580)
<i>Closely held shares</i>	-0.00109*** (-3.049)	-0.00125*** (-3.490)	-0.00108*** (-3.012)	-0.00124*** (-3.438)	-0.00108*** (-3.004)	-0.00124*** (-3.433)
<i>Institutional ownership</i>	-0.0417 (-1.297)	-0.0314 (-0.971)	-0.0424 (-1.316)	-0.0327 (-1.010)	-0.0422 (-1.309)	-0.0326 (-1.004)

<i>Board size</i>	-0.00320 (-1.169)	-0.00319 (-1.175)	-0.00323 (-1.177)	-0.00304 (-1.109)	-0.00324 (-1.182)	-0.00308 (-1.120)
<i>Board independence</i>	0.000503 (1.053)	0.000771 (1.564)	0.000491 (1.030)	0.000730 (1.481)	0.000484 (1.014)	0.000732 (1.483)
<i>Technology firm</i>	0.0136 (0.530)	0.0132 (0.515)	0.0137 (0.532)	0.0136 (0.526)	0.0136 (0.531)	0.0135 (0.524)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.191	0.193	0.191	0.192	0.191	0.192

Panel C: <i>Dummy payouts</i>	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock-based pay-performance sensitivity</i>	0.241** (2.057)					
<i>Executive stock-based pay-performance sensitivity</i>		0.265*** (2.893)				
<i>CEO stock ownership</i>			0.241** (2.012)		0.256** (2.121)	
<i>Executive stock ownership</i>				0.313*** (3.280)		0.317*** (3.308)
<i>CEO stock options delta</i>			-3.631*** (-2.664)			
<i>Executive stock options delta</i>				-2.682*** (-3.573)		
<i>CEO stock option holdings</i>					-1.927* (-1.711)	
<i>Executive stock option holdings</i>						-1.553** (-2.558)
<i>Operating income</i>	1.685*** (9.147)	1.673*** (9.072)	1.670*** (9.079)	1.651*** (8.973)	1.675*** (9.121)	1.658*** (9.016)
<i>Growth opportunities</i>	-0.0189 (-1.297)	-0.0190 (-1.306)	-0.0187 (-1.277)	-0.0194 (-1.333)	-0.0193 (-1.322)	-0.0207 (-1.424)
<i>Firm size</i>	0.0541*** (5.366)	0.0549*** (5.438)	0.0475*** (4.714)	0.0461*** (4.572)	0.0487*** (4.766)	0.0470*** (4.616)
<i>Leverage</i>	-0.115* (-1.735)	-0.113* (-1.696)	-0.117* (-1.764)	-0.121* (-1.833)	-0.110* (-1.648)	-0.111* (-1.669)
<i>Retained earnings</i>	0.0447*** (4.983)	0.0444*** (5.029)	0.0437*** (5.020)	0.0429*** (5.152)	0.0440*** (4.987)	0.0433*** (5.099)
<i>Cash</i>	0.0922 (1.186)	0.0917 (1.180)	0.0871 (1.116)	0.0838 (1.081)	0.0867 (1.114)	0.0853 (1.095)
<i>Volatility of operating income</i>	-0.862*** (-4.483)	-0.860*** (-4.477)	-0.817*** (-4.292)	-0.789*** (-4.214)	-0.834*** (-4.366)	-0.812*** (-4.317)
<i>Volatility of stock return</i>	-2.649*** (-12.52)	-2.652*** (-12.50)	-2.629*** (-12.58)	-2.618*** (-12.54)	-2.642*** (-12.58)	-2.632*** (-12.58)
<i>Stock return</i>	0.0174 (1.158)	0.0175 (1.167)	0.0250* (1.661)	0.0272* (1.821)	0.0213 (1.428)	0.0236 (1.580)
<i>Dividend tax penalty</i>	-0.217 (-1.632)	-0.210 (-1.581)	-0.235* (-1.787)	-0.232* (-1.784)	-0.223* (-1.690)	-0.219* (-1.672)
<i>Closely held shares</i>	-0.000522 (-0.999)	-0.000717 (-1.358)	-0.000637 (-1.234)	-0.000874* (-1.686)	-0.000625 (-1.203)	-0.000871* (-1.668)
<i>Institutional ownership</i>	0.00681 (0.132)	0.0182 (0.354)	0.00402 (0.0783)	0.0163 (0.319)	0.00687 (0.134)	0.0189 (0.368)

<i>Board size</i>	0.00685 (1.436)	0.00623 (1.310)	0.00669 (1.435)	0.00758 (1.616)	0.00680 (1.449)	0.00752 (1.590)
<i>Board independence</i>	-0.00153** (-2.085)	-0.00115 (-1.552)	-0.00125* (-1.734)	-0.00112 (-1.540)	-0.00132* (-1.816)	-0.00114 (-1.558)
<i>Technology firm</i>	0.0635* (1.919)	0.0633* (1.904)	0.0634* (1.912)	0.0627* (1.887)	0.0631* (1.902)	0.0626* (1.876)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.506	0.507	0.509	0.512	0.508	0.510

The table reports estimates of marginal effects (calculated at the mean values of all the independent variables) for logit regressions of payout dummies on incentive variables for CEOs and executive directors and other firm-specific variables. Detailed variable definitions can be found in Table 1. Year, industry, and country dummies are always included in the regressions but are not reported in the table. Z-statistics adjusted for heteroscedasticity and within-firm autocorrelation are reported in parentheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 4

Tobit models: baseline regressions.

Panel A: <i>Dividends / market value</i>	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock-based pay-performance sensitivity</i>	0.532 (1.222)					
<i>Executive stock-based pay-performance sensitivity</i>		0.719** (2.078)				
<i>CEO stock ownership</i>			0.504 (1.146)		0.600 (1.379)	
<i>Executive stock ownership</i>				1.001*** (2.893)		1.010*** (2.912)
<i>CEO stock options delta</i>			-38.73*** (-6.356)			
<i>Executive stock options delta</i>				-24.46*** (-7.066)		
<i>CEO stock option holdings</i>					-19.18*** (-3.855)	
<i>Executive stock option holdings</i>						-11.71*** (-4.172)
<i>Operating income</i>	8.986*** (15.69)	8.954*** (15.67)	8.739*** (15.31)	8.652*** (15.21)	8.856*** (15.49)	8.790*** (15.43)
<i>Growth opportunities</i>	-0.434*** (-7.397)	-0.436*** (-7.390)	-0.429*** (-7.091)	-0.430*** (-7.053)	-0.435*** (-7.255)	-0.439*** (-7.242)
<i>Firm size</i>	0.0755** (2.210)	0.0770** (2.252)	0.0293 (0.864)	0.0212 (0.618)	0.0405 (1.189)	0.0351 (1.023)
<i>Leverage</i>	1.025*** (3.648)	1.023*** (3.639)	1.043*** (3.751)	1.027*** (3.679)	1.085*** (3.861)	1.078*** (3.826)
<i>Retained earnings</i>	0.290*** (5.105)	0.289*** (5.112)	0.282*** (5.127)	0.282*** (5.178)	0.285*** (5.107)	0.285*** (5.148)
<i>Cash</i>	0.378 (1.061)	0.369 (1.035)	0.294 (0.834)	0.281 (0.798)	0.316 (0.893)	0.312 (0.881)
<i>Volatility of operating income</i>	-5.454*** (-5.433)	-5.473*** (-5.457)	-4.981*** (-5.189)	-4.891*** (-5.099)	-5.180*** (-5.310)	-5.146*** (-5.276)
<i>Volatility of stock return</i>	-5.788*** (-5.886)	-5.790*** (-5.891)	-5.611*** (-5.737)	-5.608*** (-5.737)	-5.702*** (-5.813)	-5.691*** (-5.799)
<i>Stock return</i>	-0.126* (-1.913)	-0.128* (-1.934)	-0.0653 (-0.989)	-0.0600 (-0.910)	-0.0986 (-1.494)	-0.0969 (-1.468)
<i>Dividend tax penalty</i>	0.934** (2.142)	0.948** (2.175)	0.848* (1.948)	0.854* (1.959)	0.893** (2.046)	0.911** (2.088)
<i>Closely held shares</i>	0.000804 (0.385)	0.000197 (0.0932)	0.000123 (0.0595)	-0.000710 (-0.339)	0.000266 (0.128)	-0.000556 (-0.264)
<i>Institutional ownership</i>	0.750*** (3.998)	0.788*** (4.180)	0.728*** (3.914)	0.793*** (4.246)	0.744*** (3.969)	0.804*** (4.272)
<i>Board size</i>	0.00271 (0.183)	0.00210 (0.142)	0.00536 (0.368)	0.0133 (0.901)	0.00481 (0.328)	0.0106 (0.715)
<i>Board independence</i>	-0.00159 (-0.546)	-0.000524 (-0.176)	-7.41e-05 (-0.0259)	-0.000579 (-0.197)	-0.000310 (-0.108)	-0.000349 (-0.118)
<i>Technology firm</i>	0.0723 (0.503)	0.0729 (0.506)	0.0849 (0.583)	0.0842 (0.577)	0.0777 (0.533)	0.0769 (0.525)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.111	0.111	0.113	0.114	0.112	0.112

Panel B: Share repurchases / market value						
	(I)	(II)	(III)	(IV)	(V)	(VI)
CEO stock-based pay-performance sensitivity	0.254 (1.045)					
Executive stock-based pay-performance sensitivity		0.533*** (2.600)				
CEO stock ownership			0.204 (0.830)		0.218 (0.885)	
Executive stock ownership				0.473** (2.278)		0.475** (2.286)
CEO stock options delta			1.462 (0.422)			
Executive stock options delta				0.980 (0.461)		
CEO stock option holdings					2.144 (0.751)	
Executive stock option holdings						1.316 (0.785)
Operating income	1.894*** (7.492)	1.873*** (7.430)	1.902*** (7.447)	1.881*** (7.357)	1.905*** (7.469)	1.884*** (7.386)
Growth opportunities	-0.0525 (-1.567)	-0.0542 (-1.609)	-0.0524 (-1.566)	-0.0539 (-1.602)	-0.0520 (-1.555)	-0.0532 (-1.583)
Firm size	0.134*** (7.286)	0.135*** (7.384)	0.135*** (7.194)	0.135*** (7.183)	0.137*** (7.241)	0.137*** (7.216)
Leverage	-0.194 (-1.202)	-0.197 (-1.229)	-0.194 (-1.205)	-0.197 (-1.226)	-0.198 (-1.227)	-0.201 (-1.251)
Retained earnings	0.00403 (0.409)	0.00305 (0.315)	0.00430 (0.437)	0.00329 (0.340)	0.00448 (0.456)	0.00343 (0.354)
Cash	1.230*** (6.313)	1.212*** (6.291)	1.232*** (6.329)	1.214*** (6.301)	1.232*** (6.335)	1.213*** (6.307)
Volatility of operating income	-0.587 (-1.471)	-0.607 (-1.519)	-0.600 (-1.505)	-0.615 (-1.559)	-0.614 (-1.533)	-0.628 (-1.587)
Volatility of stock return	-2.514*** (-5.000)	-2.510*** (-5.025)	-2.519*** (-5.019)	-2.515*** (-5.040)	-2.524*** (-5.025)	-2.520*** (-5.052)
Stock return	0.0375 (0.982)	0.0368 (0.962)	0.0360 (0.940)	0.0359 (0.941)	0.0355 (0.930)	0.0356 (0.933)
Dividend tax penalty	0.253 (1.124)	0.256 (1.137)	0.259 (1.146)	0.267 (1.179)	0.262 (1.158)	0.270 (1.195)
Closely held shares	-0.00187* (-1.723)	-0.00240** (-2.217)	-0.00182* (-1.677)	-0.00231** (-2.135)	-0.00181* (-1.667)	-0.00231** (-2.134)
Institutional ownership	0.0557 (0.533)	0.0890 (0.851)	0.0542 (0.519)	0.0859 (0.821)	0.0549 (0.526)	0.0863 (0.826)
Board size	-0.0125 (-1.485)	-0.0124 (-1.492)	-0.0127 (-1.510)	-0.0127 (-1.514)	-0.0128 (-1.522)	-0.0131 (-1.560)
Board independence	0.00115 (0.792)	0.00200 (1.349)	0.00105 (0.722)	0.00187 (1.262)	0.000998 (0.683)	0.00190 (1.278)
Technology firm	0.0235 (0.318)	0.0228 (0.308)	0.0240 (0.326)	0.0233 (0.315)	0.0243 (0.329)	0.0234 (0.316)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.0752	0.0759	0.0751	0.0757	0.0752	0.0758

Panel C: Total payout / market value						
	(I)	(II)	(III)	(IV)	(V)	(VI)
CEO stock-based pay-performance sensitivity	0.995* (1.653)					
Executive stock-based pay-performance sensitivity		1.449*** (2.947)				
CEO stock ownership			0.906 (1.496)		1.030* (1.708)	
Executive stock ownership				1.659*** (3.366)		1.680*** (3.406)
CEO stock options delta			-36.40*** (-4.481)			
Executive stock options delta				-22.41*** (-4.633)		
CEO stock option holdings					-16.43** (-2.479)	
Executive stock option holdings						-9.378** (-2.443)
Operating income	10.32*** (12.89)	10.26*** (12.86)	10.12*** (12.67)	10.03*** (12.62)	10.22*** (12.77)	10.14*** (12.73)
Growth opportunities	-0.501*** (-5.540)	-0.505*** (-5.564)	-0.497*** (-5.448)	-0.503*** (-5.503)	-0.502*** (-5.522)	-0.509*** (-5.581)
Firm size	0.219*** (4.609)	0.222*** (4.686)	0.174*** (3.633)	0.168*** (3.480)	0.188*** (3.911)	0.186*** (3.836)
Leverage	1.127*** (2.868)	1.125*** (2.873)	1.144*** (2.925)	1.127*** (2.886)	1.176*** (2.991)	1.168*** (2.979)
Retained earnings	0.295*** (5.774)	0.293*** (5.790)	0.288*** (5.795)	0.287*** (5.848)	0.291*** (5.774)	0.289*** (5.815)
Cash	2.530*** (4.935)	2.507*** (4.916)	2.476*** (4.799)	2.450*** (4.771)	2.488*** (4.843)	2.471*** (4.831)
Volatility of operating income	-4.431*** (-3.302)	-4.474*** (-3.342)	-3.974*** (-2.956)	-3.901*** (-2.917)	-4.189*** (-3.119)	-4.183*** (-3.136)
Volatility of stock return	-9.020*** (-6.539)	-9.021*** (-6.559)	-8.843*** (-6.425)	-8.857*** (-6.436)	-8.939*** (-6.489)	-8.938*** (-6.491)
Stock return	-0.154 (-1.626)	-0.156* (-1.648)	-0.0963 (-1.012)	-0.0904 (-0.949)	-0.130 (-1.373)	-0.129 (-1.354)
Dividend tax penalty	1.050* (1.749)	1.079* (1.797)	0.958 (1.599)	0.982 (1.635)	1.014* (1.691)	1.052* (1.749)
Closely held shares	-0.000531 (-0.188)	-0.00181 (-0.640)	-0.00110 (-0.393)	-0.00251 (-0.893)	-0.000971 (-0.345)	-0.00239 (-0.845)
Institutional ownership	1.157*** (4.286)	1.235*** (4.568)	1.134*** (4.202)	1.239*** (4.580)	1.152*** (4.257)	1.251*** (4.614)
Board size	-0.0194 (-0.938)	-0.0205 (-0.992)	-0.0165 (-0.802)	-0.00893 (-0.434)	-0.0174 (-0.843)	-0.0128 (-0.623)
Board independence	-0.00101 (-0.255)	0.00122 (0.299)	0.000497 (0.126)	0.00104 (0.258)	0.000133 (0.0336)	0.00131 (0.323)
Technology firm	0.0660 (0.343)	0.0652 (0.337)	0.0739 (0.382)	0.0710 (0.367)	0.0678 (0.350)	0.0662 (0.341)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.0807	0.0810	0.0817	0.0822	0.0811	0.0815

Panel D: Share repurchases / total payout						
	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock-based pay-performance sensitivity</i>	-3.081 (-0.493)					
<i>Executive stock-based pay-performance sensitivity</i>		4.438 (0.884)				
<i>CEO stock ownership</i>			-4.682 (-0.736)		-4.747 (-0.745)	
<i>Executive stock ownership</i>				0.996 (0.194)		1.070 (0.208)
<i>CEO stock options delta</i>			265.3*** (2.686)			
<i>Executive stock options delta</i>				140.5** (2.394)		
<i>CEO stock option holdings</i>					174.7** (2.327)	
<i>Executive stock option holdings</i>						90.44** (2.109)
<i>Operating income</i>	-13.48 (-1.606)	-13.68 (-1.631)	-12.16 (-1.449)	-12.30 (-1.462)	-12.49 (-1.487)	-12.71 (-1.509)
<i>Growth opportunities</i>	0.876 (0.947)	0.864 (0.929)	0.899 (0.980)	0.887 (0.959)	0.917 (1.000)	0.915 (0.990)
<i>Firm size</i>	2.268*** (5.200)	2.285*** (5.249)	2.556*** (5.745)	2.551*** (5.694)	2.549*** (5.680)	2.542*** (5.621)
<i>Leverage</i>	-10.68** (-2.508)	-10.65** (-2.498)	-10.68** (-2.510)	-10.61** (-2.492)	-11.00*** (-2.581)	-10.96** (-2.568)
<i>Retained earnings</i>	-1.839*** (-4.072)	-1.846*** (-4.088)	-1.765*** (-4.086)	-1.796*** (-4.133)	-1.775*** (-4.072)	-1.807*** (-4.123)
<i>Cash</i>	31.65*** (6.240)	31.25*** (6.178)	32.15*** (6.376)	31.66*** (6.289)	32.18*** (6.357)	31.57*** (6.262)
<i>Volatility of operating income</i>	28.21** (2.241)	27.07** (2.131)	24.91** (2.063)	23.60* (1.916)	25.93** (2.128)	24.77** (1.995)
<i>Volatility of stock return</i>	9.714 (0.779)	9.291 (0.744)	7.658 (0.615)	7.920 (0.635)	7.922 (0.636)	8.137 (0.653)
<i>Stock return</i>	-0.138 (-0.141)	-0.140 (-0.142)	-0.460 (-0.468)	-0.438 (-0.445)	-0.316 (-0.323)	-0.280 (-0.286)
<i>Dividend tax penalty</i>	4.252 (0.783)	4.314 (0.796)	4.969 (0.913)	5.141 (0.944)	4.761 (0.874)	4.937 (0.907)
<i>Closely held shares</i>	-0.0943*** (-3.467)	-0.102*** (-3.712)	-0.0905*** (-3.335)	-0.0965*** (-3.521)	-0.0909*** (-3.345)	-0.0969*** (-3.535)
<i>Institutional ownership</i>	-3.361 (-1.420)	-2.809 (-1.170)	-3.273 (-1.387)	-2.986 (-1.247)	-3.342 (-1.415)	-3.028 (-1.263)
<i>Board size</i>	-0.366* (-1.920)	-0.353* (-1.865)	-0.393** (-2.062)	-0.412** (-2.155)	-0.391** (-2.048)	-0.408** (-2.131)
<i>Board independence</i>	0.0433 (1.178)	0.0544 (1.436)	0.0317 (0.874)	0.0492 (1.300)	0.0314 (0.863)	0.0486 (1.283)
<i>Technology firm</i>	-0.294 (-0.164)	-0.275 (-0.154)	-0.325 (-0.181)	-0.296 (-0.164)	-0.303 (-0.168)	-0.272 (-0.151)
Observations	5,080	5,080	5,080	5,080	5,080	5,080
Pseudo R-squared	0.0335	0.0335	0.0344	0.0342	0.0342	0.0340

The table reports estimates of marginal effects (calculated at the mean values of all the independent variables) for several tobit regressions of payout yields and the share of repurchases in total payout on incentive variables for CEOs and executive directors and other firm-specific variables. Detailed variable definitions can be found in Table 1. Year, industry, and country dummies are always included in the regressions but are not reported in the table. *T*-statistics adjusted for heteroscedasticity and within-firm autocorrelation are reported in parentheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 5: Logit and tobit models: Exercisable vs. non-exercisable options.

Panel A	<i>Dummy dividends</i>		<i>Dummy repurchases</i>		<i>Dummy payouts</i>	
	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock ownership</i>	0.400** (2.386)		0.0325 (0.408)		0.252** (2.087)	
<i>Executive stock ownership</i>		0.432*** (3.282)		0.138** (2.005)		0.316*** (3.302)
<i>CEO exercisable option holdings</i>	-5.146*** (-2.649)		-0.537 (-0.460)		-3.175** (-2.139)	
<i>Executive exercisable option holdings</i>		-4.333*** (-4.014)		-0.466 (-0.619)		-2.547*** (-3.030)
<i>CEO non-exercisable option holdings</i>	-2.307 (-1.159)		0.819 (0.611)		-1.322 (-0.870)	
<i>Executive non-exercisable option holdings</i>		-1.382 (-1.261)		0.0957 (0.128)		-1.039 (-1.251)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.524	0.527	0.191	0.192	0.508	0.511

Panel B	<i>Dividends / market value</i>		<i>Share repurchases / market value</i>		<i>Total payout / market value</i>		<i>Share repurchases / total payout</i>	
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock ownership</i>	0.624 (1.435)		0.219 (0.891)		1.053* (1.742)		-4.838 (-0.758)	
<i>Executive stock ownership</i>		1.053*** (3.049)		0.474** (2.281)		1.712*** (3.470)		0.701 (0.136)
<i>CEO exercisable option holdings</i>	-33.00*** (-4.724)		1.904 (0.498)		-28.43*** (-2.972)		226.0** (2.245)	
<i>Executive exercisable option holdings</i>		-24.17*** (-6.199)		1.372 (0.567)		-19.80*** (-3.400)		151.9** (2.425)
<i>CEO non-exercisable option holdings</i>	-6.969 (-1.007)		2.766 (0.672)		-5.289 (-0.573)		132.2 (1.166)	
<i>Executive non-exercisable option holdings</i>		-1.863 (-0.485)		0.953 (0.414)		-1.322 (-0.259)		34.51 (0.559)
Observations	6,982	6,982	6,982	6,982	6,982	6,982	5,080	5,080
Pseudo R-squared	0.112	0.113	0.0752	0.0758	0.0812	0.0818	0.0342	0.0341

The table reports estimates of marginal effects (calculated at the mean values of all the independent variables) for logit (panel A) and tobit (panel B) regressions of payout measures on incentive variables for CEOs and executive directors and other firm-specific variables. As in Tables 3 and 4, the models include the control variables *operating income*, *growth opportunities*, *firm size*, *leverage*, *retained earnings*, *cash*, *volatility of operating income*, *volatility of stock return*, *stock return*, *dividend tax penalty*, *closely held shares*, *institutional ownership*, *board size*, *board independence*, and *technology firm*. Marginal effects for these variables are not shown in the table. Detailed variable definitions can be found in Table 1. Year, industry, and country dummies are always included in the regressions but are not reported. Z-statistics (panel A) and *t*-statistics (panel B) adjusted for heteroscedasticity and within-firm autocorrelation are reported in parentheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 6: Logit and tobit models: In-the-money vs. out-of-the-money options.

Panel A	<i>Dummy dividends</i>		<i>Dummy repurchases</i>		<i>Dummy payouts</i>	
	(I)	(II)	(III)	(IV)	(V)	(VI)
<i>CEO stock ownership</i>	0.398** (2.373)		0.0330 (0.413)		0.253** (2.091)	
<i>Executive stock ownership</i>		0.430*** (3.262)		0.137** (1.992)		0.315*** (3.285)
<i>CEO in-the-money option holdings</i>	-3.997** (-2.206)		-0.0124 (-0.0121)		-2.381* (-1.780)	
<i>Executive in-the-money option holdings</i>		-3.121*** (-3.124)		-0.220 (-0.345)		-1.925*** (-2.590)
<i>CEO out-of-the-money option holdings</i>	-3.345 (-1.589)		0.670 (0.428)		-1.827 (-1.113)	
<i>Executive out-of-the-money option holdings</i>		-2.739** (-2.403)		-0.122 (-0.136)		-1.823** (-2.054)
Observations	6,982	6,982	6,982	6,982	6,982	6,982
Pseudo R-squared	0.524	0.526	0.191	0.192	0.508	0.511

Panel B								
	<i>Dividends / market value</i>		<i>Share repurchases / market value</i>		<i>Total payout / market value</i>		<i>Share repurchases / total payout</i>	
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock ownership</i>	0.587 (1.350)		0.225 (0.914)		1.023* (1.692)		-4.528 (-0.710)	
<i>Executive stock ownership</i>		1.009*** (2.910)		0.477** (2.287)		1.676*** (3.399)		1.173 (0.228)
<i>CEO in-the-money option holdings</i>	-21.27*** (-3.842)		0.860 (0.290)		-19.99*** (-2.753)		146.6* (1.699)	
<i>Executive in-the-money option holdings</i>		-13.76*** (-4.265)		0.763 (0.389)		-11.55** (-2.526)		72.54 (1.372)
<i>CEO out-of-the-money option holdings</i>	-19.42** (-2.266)		5.403 (1.170)		-13.53 (-1.217)		275.0** (2.195)	
<i>Executive out-of-the-money option holdings</i>		-11.51** (-2.322)		1.626 (0.610)		-10.10 (-1.598)		130.8* (1.831)
Observations	6,982	6,982	6,982	6,982	6,982	6,982	5,080	5,080
Pseudo R-squared	0.112	0.112	0.0753	0.0758	0.0811	0.0815	0.0343	0.0340

The table reports estimates of marginal effects (calculated at the mean values of all the independent variables) for logit (panel A) and tobit (panel B) regressions of payout measures on incentive variables for CEOs and executive directors and other firm-specific variables. As in Tables 3 and 4, the models include the control variables *operating income*, *growth opportunities*, *firm size*, *leverage*, *retained earnings*, *cash*, *volatility of operating income*, *volatility of stock return*, *stock return*, *dividend tax penalty*, *closely held shares*, *institutional ownership*, *board size*, *board independence*, and *technology firm*. Marginal effects for these variables are not shown in the table. Detailed variable definitions can be found in Table 1. Year, industry, and country dummies are always included in the regressions but are not reported. Z-statistics (panel A) and t-statistics (panel B) adjusted for heteroscedasticity and within-firm autocorrelation are reported in parentheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 7
Probit and tobit models: Instrumental variable regressions.

Panel A												
	<i>Dummy dividends</i>								<i>Dummy repurchases</i>			
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
<i>CEO stock-based pay-performance sensitivity</i>	2.558 ** (2.3)								0.905 (1.6)			
<i>Executive stock-based pay-performance sensitivity</i>		1.981 *** (2.82)								0.127 (0.31)		
<i>CEO stock ownership</i>			2.654 ** (2.4)								0.942 (1.58)	
<i>Executive stock ownership</i>				2.218 *** (3.25)								0.153 (0.36)
<i>CEO stock options delta</i>					-49.718 *** (-10.96)							
<i>Executive stock options delta</i>						-26.888 *** (-5.56)						
<i>CEO stock option holdings</i>							-40.456 *** (-12.2)					
<i>Executive stock option holdings</i>								-20.768 *** (-6.57)				
p-value of Kleibergen-Paap test	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000	0.0000	0.0000	0.0000	0.0000
p-value of exogeneity test	0.0857	0.0418	0.0841	0.0307	0.0066	0.017	0.0081	0.0033	0.1289	0.953	0.1263	0.9628

Panel B												
	<i>Dummy repurchases</i>				<i>Dummy payouts</i>							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)
<i>CEO stock-based pay-performance sensitivity</i>					2.795 *** (3.92)							
<i>Executive stock-based pay-performance sensitivity</i>						1.871 *** (2.75)						
<i>CEO stock ownership</i>							2.854 *** (3.9)					
<i>Executive stock ownership</i>								2.034 *** (3.02)				
<i>CEO stock options delta</i>	6.931 (0.3)								-42.589 *** (-3.84)			
<i>Executive stock options delta</i>		-9.353 (-1.64)								-27.135 *** (-8.6)		
<i>CEO stock option holdings</i>			6.507 (0.3)								-35.841 *** (-4.29)	
<i>Executive stock option holdings</i>				-7.7221 (-1.6)								-21.331 *** (-9.6)
p-value of Kleibergen-Paap test	0.0623	0.0000	0.1014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000
p-value of exogeneity test	0.7679	0.1083	0.7755	0.113	0.0017	0.0319	0.0019	0.0224	0.0424	0.0001	0.0435	0.0000

Panel C								
	<i>Dividends / market value</i>							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock-based pay-performance sensitivity</i>	6.169 *							
	(1.85)							
<i>Executive stock-based pay-performance sensitivity</i>		6.201 **						
		(2.49)						
<i>CEO stock ownership</i>			6.035 *					
			(1.79)					
<i>Executive stock ownership</i>				6.95 ***				
				(2.72)				
<i>CEO stock options delta</i>					-376.687 *			
					(-1.79)			
<i>Executive stock options delta</i>						-62.564		
						(-0.94)		
<i>CEO stock option holdings</i>							-342.502	
							(-1.55)	
<i>Executive stock option holdings</i>								-61.545 *
								(-1.93)
p-value of Kleibergen-Paap test	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000
p-value of exogeneity test	0.0834	0.0273	0.1027	0.0198	0.1063	0.565	0.1415	0.1144

Panel D								
	<i>Share repurchases / market value</i>							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock-based pay-performance sensitivity</i>	3.753 *							
	(1.91)							
<i>Executive stock-based pay-performance sensitivity</i>		1.616						
		(1.32)						
<i>CEO stock ownership</i>			3.94 *					
			(1.88)					
<i>Executive stock ownership</i>				1.674				
				(1.32)				
<i>CEO stock options delta</i>					25.455			
					(0.36)			
<i>Executive stock options delta</i>						-20.987		
						(-0.95)		
<i>CEO stock option holdings</i>							24.139	
							(0.36)	
<i>Executive stock option holdings</i>								-20.762
								(-1.11)
p-value of Kleibergen-Paap test	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000
p-value of exogeneity test	0.071	0.3537	0.0731	0.3234	0.7366	0.3132	0.747	0.2315

Panel E								
	<i>Total payout / market value</i>							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock-based pay-performance sensitivity</i>	11.256 ** (2.57)							
<i>Executive stock-based pay-performance sensitivity</i>		11.155 *** (3.15)						
<i>CEO stock ownership</i>			11.345 ** (2.44)					
<i>Executive stock ownership</i>				12.038 *** (3.24)				
<i>CEO stock options delta</i>					-275.58 (-1.37)			
<i>Executive stock options delta</i>						-89.391 (-0.92)		
<i>CEO stock option holdings</i>							-249.201 (-1.23)	
<i>Executive stock option holdings</i>								-88.031 * (-1.73)
p-value of Kleibergen-Paap test	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000
p-value of exogeneity test	0.0168	0.0057	0.024	0.0047	0.2346	0.4862	0.2477	0.1205

Panel F								
	Share repurchases / total payout							
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)
<i>CEO stock-based pay-performance sensitivity</i>	43.724 (0.93)							
<i>Executive stock-based pay-performance sensitivity</i>		-13.229 (-0.49)						
<i>CEO stock ownership</i>			44.602 (1.09)					
<i>Executive stock ownership</i>				-20.331 (-0.72)				
<i>CEO stock options delta</i>					2773.362 (1.09)			
<i>Executive stock options delta</i>						-504.874 (-0.85)		
<i>CEO stock option holdings</i>							1974.283 (1.09)	
<i>Executive stock option holdings</i>								-343.954 (-0.75)
p-value of Kleibergen-Paap test	0.0000	0.0000	0.0000	0.0000	0.0623	0.0000	0.1014	0.0000
p-value of exogeneity test	0.3062	0.5467	0.2663	0.4843	0.3236	0.2743	0.3192	0.3389

The table reports estimates of marginal effects (calculated at the mean values of all the independent variables) for instrumental variable probit (Panels A and B) and tobit (Panels C-F) regressions of payout variables on CEO and executive incentive variables and other firm-specific variables. The specifications of Table 3 (Table 4) are re-estimated using a probit (tobit) estimation technique and assuming that one of the incentive variables at a time is endogenous. For example, in column I of Panel A, *CEO stock-based pay-performance sensitivity* is considered endogenous while all the other independent variables are assumed exogenous. In column V of the same panel, *CEO stock options delta* is treated as endogenous and all the other independent variables (including *CEO stock ownership*) are considered exogenous. The age of the CEO and his/her tenure (time in role) are used as instruments in columns I, III, IX, and XI of Panel A, columns V and VII of Panel B, and columns I and III of Panels C-F. CEO age is considered as an instrument in columns V and VII of Panel A, columns I, III, IX, and XI of Panel B, and columns V and VII of Panels C-F. The average tenure of an executive director, the sum of the ages of all the executive directors, and the sum of their tenures are used as instruments in columns II, IV, VI, X, and XII of Panel A, columns II, VI, VIII, and X of Panel B, and columns II, IV, and VI of Panels C-F. The sum of the ages of all the executive

directors and the sum of their tenures are exploited as instruments in column VIII of Panel A, columns IV and XII of Panel B, and column VIII of Panels C-F. Instruments are chosen by running Kleibergen-Paap underidentification tests. The table reports marginal effects only for the variables that are assumed to be endogenous. Detailed variable definitions can be found in Table 1. Z-statistics adjusted for heteroscedasticity and within-firm autocorrelation are reported in parentheses. The table includes both the p-value of the Kleibergen-Paap underidentification test and the p-value of a Wald exogeneity test whose null hypothesis is that the instrumented variable is exogenous.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 8
Bias-corrected nearest-neighbor matching estimations.

Panel A							
	<i>Dummy dividends</i>	<i>Dummy repurchases</i>	<i>Dummy payouts</i>	<i>Dividends / market value</i>	<i>Share repurchases / market value</i>	<i>Total payout / market value</i>	<i>Share repurchases / total payout</i>
ATE above-median vs. below-median values of:							
<i>CEO stock-based pay-performance sensitivity</i>	0.006 (0.52)	0.028 ** (2.09)	0.009 (0.83)	-0.355 *** (-3.96)	0.065 (1.02)	-0.33 ** (-2.56)	2.35 *** (2.76)
<i>Executive stock-based pay-performance sensitivity</i>	0.039 *** (3.56)	0.026 * (1.87)	0.036 *** (3.31)	-0.311 *** (-3.44)	0.028 (0.44)	-0.327 ** (-2.55)	-0.419 (-0.41)
<i>CEO stock ownership</i>	0.039 *** (3.77)	0.033 ** (2.55)	0.041 *** (4.05)	-0.056 (-0.64)	-0.011 (-0.17)	-0.043 (-0.34)	-0.857 (-1.01)
<i>Executive stock ownership</i>	0.069 *** (6.61)	0.034 ** (2.55)	0.065 *** (6.42)	-0.015 (-0.17)	0.063 (0.97)	0.109 (0.83)	-1.892 ** (-2.14)
<i>CEO stock options delta</i>	-0.04 *** (-3.5)	0.005 (0.36)	-0.033 *** (-3.05)	-0.421 *** (-4.2)	0.081 (1.36)	-0.385 *** (-2.73)	3.194 *** (3.52)
<i>Executive stock options delta</i>	-0.04 *** (-3.43)	0.01 (0.74)	-0.035 *** (-3.23)	-0.424 *** (-4.05)	0.11 * (1.75)	-0.355 ** (-2.41)	3.737 *** (3.99)
<i>CEO stock option holdings</i>	-0.039 *** (-3.47)	0.011 (0.81)	-0.033 *** (-3.1)	-0.309 *** (-2.96)	0.094 (1.59)	-0.256 * (-1.77)	3.752 *** (4.17)
<i>Executive stock option holdings</i>	-0.05 *** (-4.21)	0.013 (0.89)	-0.052 *** (-4.67)	-0.33 *** (-3.16)	0.113 * (1.81)	-0.236 (-1.61)	3.788 *** (4.14)

Panel B							
	<i>Dummy dividends</i>	<i>Dummy repurchases</i>	<i>Dummy payouts</i>	<i>Dividends / market value</i>	<i>Share repurchases / market value</i>	<i>Total payout / market value</i>	<i>Share repurchases / total payout</i>
ATE above-median vs. below-median values of:							
<i>CEO stock-based pay-performance sensitivity</i>	0.008 (0.69)	0.025 * (1.86)	0.017 (1.48)	-0.409 *** (-4.45)	0.065 (1.01)	-0.387 *** (-2.91)	2.987 *** (3.2)
<i>Executive stock-based pay-performance sensitivity</i>	0.03 ** (2.21)	0.015 (1.05)	0.032 *** (2.59)	-0.348 *** (-3.67)	0.026 (0.38)	-0.371 *** (-2.7)	0.061 (0.06)
<i>CEO stock ownership</i>	0.036 *** (3.08)	0.026 ** (2.07)	0.039 *** (3.46)	0.023 (0.25)	0.012 (0.2)	0.061 (0.45)	0.96 (1.08)
<i>Executive stock ownership</i>	0.06 *** (4.92)	0.037 *** (2.84)	0.068 *** (5.73)	0.003 (0.03)	0.076 (1.1)	0.128 (0.93)	-0.76 (-0.77)
<i>CEO stock options delta</i>	-0.042 *** (-3.49)	0.009 (0.63)	-0.035 *** (-3.14)	-0.492 *** (-5.13)	0.064 (1)	-0.467 *** (-3.44)	3.153 *** (3.37)
<i>Executive stock options delta</i>	-0.037 *** (-3.1)	0.011 (0.81)	-0.037 *** (-3.3)	-0.409 *** (-4.06)	0.084 (1.33)	-0.367 *** (-2.63)	3.612 *** (3.6)
<i>CEO stock option holdings</i>	-0.041 *** (-3.48)	0.007 (0.56)	-0.033 *** (-2.9)	-0.325 *** (-3.5)	0.06 (0.99)	-0.296 ** (-2.25)	3.624 *** (4)
<i>Executive stock option holdings</i>	-0.05 *** (-3.97)	0.01 (0.66)	-0.053 *** (-4.54)	-0.342 *** (-3.32)	0.099 (1.59)	-0.257 * (-1.8)	4.342 *** (4.34)

The table reports bias-corrected nearest-neighbor matching estimates of average treatment effects (ATEs) of incentive variables (listed in the first column) on payout variables (listed in the first row). Specifically, for all the incentive variables, dummies are created separating observations with above-median values of the incentive variables from observations with below-median values of the same variables. These dummies are exploited to estimate ATEs of incentive variables on payout variables using a nearest-neighbour matching technique. In Panel A, all the control variables in Tables 3 and 4 are used as matching variables. In Panel B, the same control variables are used as matching variables only if they are statistically significant determinants of the binary incentive variables at a 10% significance level. Significance is ascertained by estimating probit models. Detailed variable definitions can be found in Table 1. Z-statistics are reported in parentheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.